

# COMPUTERWORLD

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## Trend to Mixed-Vendor Use Part of Success Story

By Phyllis Huggins  
CW Staff Writer

**LOS ANGELES.** How can your management \$50,000-\$100,000 a year in equipment rentals by using mixed-vendor systems is the story that Pacific Mutual Life Insurance Co. (PMLI) is telling.

The trend to mixed vendors is one of the most dynamic developments in the IBM-led DP industry, and Pacific Mutual is not the average IBM installation. PMLI is famous on the West Coast because until recently it successfully ran a high-volume shop using a Univac I and

two Univacs doing its own maintenance.

PMLI was never an IBM captive installation because it had in-house hardware skills to help evaluate equipment

several days a week, it couldn't risk poor performance or vendor relations with whom they express full satisfaction.

The solution: a computer center that is home to six vendors with whom they express full satisfaction. Total cost savings haven't been realized since the company is waiting for more peripherals that haven't been delivered.

The motive for going this route was not budget cuts but a desire for best performance for the dollar.

IBM's 360/65 with \$12K per month is the third party lease but savings brought about by this step are not figured

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### CAI Travels On

Elementary school teachers in Pennsylvania are learning to recognize characteristics of handicapped children with a computer-aided instruction system in a van that comes directly to a school in their area. The system gives teachers enough information to refer children to the proper doctor. The IBM 1500 system includes synchronized audio equipment so that teachers can hear examples of garbled speech relating to particular handicaps.

### Spotlight on User's Lib

When the vintage machines were retired in 1969, an IBM 360/65 was brought in. PMLI not only had the conversion problem to cope with but as it operates 24 hours,

## 4 Leasing Firms to Provide Maintenance Source Choice

By Edward J. Bride  
CW Staff Writer

**NEW YORK.** The standard leasing contract requirement of "maintenance by manufacturer" was eliminated by four major leasing companies last week, liberalizing some 500 users from similar restrictions.

Under the new agreement, customers who lease "mixed systems" can also obtain all their maintenance services from one source.

Data Processing Financial and General (DPF), Diebold Computer Leasing, Randolph Computer, and Talcott Computer Leasing have agreed to permit an independent maintenance company, Comma Corp., to service their customers.

Comma "specializes" in IBM

equipment, but has expertise in other computers with the "capability to expand" to all manufacturers' equipment, said Board Chairman Richard K. Puder.

The company, which has been

in business about a year, formerly provided maintenance for owners, lessors and plug-to-plug contractors, he added.

Since IBM still considers main-

tenance as part of its leasing

contract, users now have a real

choice of where they get their

maintenance, while retaining the

advantages of leasing.

IBM said it was not considering

separating maintenance charges

from its leasing contracts and did not elaborate on whether the matter would be brought

under consideration when actual

price differentials are available.

10% Below IBM Prices

Comma's maintenance costs have been approximately 10% below IBM's, Puder claimed. The company already has customers under the new agreement, he added.

Officials of all four leasing companies had praise for Comma, with DPF's Ryan Poppe emphasizing the way "it's important" to the leasing industry. Poppe is also president of the Computer Lessors Association.

He said third-party maintenance companies offer "responsive" services at a cost saving for lessening customers, and suggested Comma "can best do the job" for DPF and its cus-

tomers. Cornelius T. Ryan of Randolph noted cost savings and technical advantages of the independent company, and John J. Graham of Diebold said he had high regard for Comma's service and reliability.

Truman Rue of Talcott noted Comma's 10 current locations, plus planned service centers, would provide "the optimum" in maintenance services for users.

Comma provides maintenance service to computer systems owners and users, and supports computer equipment manufacturers and leasing companies with a complete range of man-

(Continued on Page 2)

## 39.5% Pass DPMA Programmer Test

By Edward J. Bride

CW Staff Writer

**PARK RIDGE, Ill.** The results are in, and 39.5% of the candidates passed the first annual Registered Business Programmer Examination last October.

Over 1,100 students took the test at various locations in the U.S. and Canada, and the Data Processing Management Association (DPMA) reported that 434 candidates were successful.

Although it did not disclose the minimum cutoff point, DPMA said the pass rate was 88% with 126 of the 143 questions answered correctly. Seven questions were eliminated after a post-test evaluation by the DPMA Certification Council.

### 'Editing Problems'

The association's preliminary review of the examination ad-

mitted "editing problems" with the test, but said the problems "do not detract from the relevance" of the test "as a measure of business programmer knowledge." In fact, the council said the test met the objectives

"in greater measure than anticipated."

Regarding criticism of certain appropriateness of certain questions, the report said a group of "programmers and experts" had considerable agreement on the

higher ranking tasks, but considerable disagreement regarding the importance of lower ranking tasks.

"Therefore, the decision was made to include questions in the

(Continued on Page 2)

### College Survey

## DP Appeals to Class of '70

**RADHWAY, N.J.** One hundred and twenty-five thousand of last year's college graduates "definitely would like" data processing as a career, according to a recent study by Placement Research here.

A recently released study at four universities, more than half of the 2,600 students termed DP acceptable, and one-eighth said definitely would like it. Placement Research says that the data is representative of all of the estimated 1 million 1970 college graduates, thus the 125,000 figure.

The study was based on career interest self-evaluations of seniors and graduate students in the class of '70 on four major campuses: Maryland, Michigan State, Rhode Island and Rutgers universities. Completed with the cooperation of placement officers at the respective institutions, the evaluations were used by Placement Research in a

computerized recruitment screening service that matches students' career interests with specific job opportunities.

Each student was asked to rank his preferences for various types of work by degree of interest. For EDP as a job activity, the overall response for 1970 men and women was:

Acceptable ..... 25% would consider favorably, 17.8% and definitely would like, 13.7%. On the negative side, 26.5% were unlikely to consider, 18.4% definitely would not like.

Among men, the respective percentages were: 28.3, 20.4, 14.3, 24.8 and 12.1. Among women, they were 15.3, 10.3, 7.8, 31.5 and 35.1.

The study also looked at student preferences on the basis of areas of study.

"As might be expected," Alan M. Levine, head of

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## Guard Your Home With a Mini

**NEW YORK** — Burglars might be advised to put minis on their list of "arch enemies."

Honeywell Inc. has ordered 12 Varian 620/Fs for installation at six central stations to comprise a protective computer network.

The system will provide continuous monitoring of burglar alarms installed at more than 1,000 businesses and 14,000 homes, jeweler, furrier, and retail stores.

Part of the system includes special codes which the com-

puter recognizes and acts upon. A triggered burglar alarm alerts the computer, which then waits a specified time, usually 30 seconds, to see whether the alarm is canceled.

If the cancellation code does not come in, the computer activates both audio and visual alarms at the central station.

### Tip Off Possible

An observer then intervenes and alerts a special dispatcher who in turn sends guards or policemen to the scene.

A customer under whose ho-

use has been ordered to send in a cancellation of the burglar alarm, can tip off the computer to the situation by using the wrong code number. Code numbers that come in are automatically checked and verified.

If there is a discrepancy, the alarm signals are activated and help is sent to the scene.

The network will also monitor fire alarms and alarms detecting water seepage in basements, cold storage temperatures, and air conditioning malfunctions.



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## Montana's Legislators Have Easy Access to Law

By Michael Barnes

**HELENA**, Mont. — Montana has programmed the state's Constitution, the national Constitution, and all the state laws into a retrieval system for use by the Montana State Legislature.

Designated the Statutory Information Retrieval System (Sirs), the system will print out information on the laws of the state or country after a given interrogation by category.

Included in the system is a codebase in which the designers described as a dictionary of the words in the state laws and constitutions and the sections of the laws in which they appear.

Troy M. McGee, director of the state's IBM-equipped central data processing division, explained that the test demonstration of the system was a query requesting a printout of all sections of law dealing concerned with aircraft.

The system took less than five minutes, McGee said, and gave a printout of the 163 references to "aircraft" in the state laws.

The system was designed to provide the information to the state legislature. The upcoming session of the legislature will have an opportunity to employ the system soon.

The Montana Constitution has been amended to change the minimum voting age to 19. All laws mentioning the minimum voting age of 21 will have to be searched for the change. An offi-

cial said a search like that could consume months in the manual search methods employed prior to Sirs.

Sirs cost the state \$62,500, and can be updated after each legislative session for a cost of \$7,500, McGee said.

## 39.5% Pass DPMA's Programmer Test

(Continued from Page 1)

examination on every task receiving votes" by evaluators in banking, retailing, and utility industries.

The report noted that every question was read and evaluated by "several persons judged to have extensive knowledge in programming" and that the test stood as an "adequate measure of business programmer knowledge in its present form."

DPMA said it had passed the examination of experience, "less than a dozen candidates," with less than two years' experience passed. This fact, plus the top grade of 88%, led the certification council to conclude that the test "meets moderately rigorous standards."

Aside from the seven questions eliminated, the test had 18 with typographical errors which "did not appear" to affect the validity of the questions, the report contended.

A five-member subcommittee has been established by the council to act as advisors for all subsequent Registered Business Programmer Examinations.

## Over Half of Students Surveyed 'Definitely Would Like' DP Career

(Continued from Page 1)

Placement Research, reported, "computer science majors showed the strongest preferences: 94.1% of the seniors and every graduate student expressed themselves as 'definitely would like.'

"While there was no computer science senior in the 'definitely would not like' group, 2.9% did say they were unlikely to consider. And computer science students also showed a very strong interest (88%) in finance and insurance."

Physical science-math and engineering students were also strongly inclined toward EDP, with 37.1% checking "definitely would like," 28% "consider

favorably" and 23.1% "accept-

Fine arts majors, on the other hand, were among the least inclined toward EDP. Among seniors 36.4% said they "definitely would not like" it, and 39% said they were "unlikely to consider" the field.

By comparison, the same total group of students opted for manufacturing as a job activity with a 59% favorable vote; 86% said they "definitely would like" a career, 55% expressed a positive interest in selling and 68% could see themselves in marketing, advertising and public relations.

Placement Research's job matching service is available on 34 campuses this year.



## Pick a Celica

Prospective owners of Toyota Celica autos select the model and options desired with the aid of the "Car-puter." IBM 2780 Optical Input unit, linked with a 2740 printer to the Katakanshi Sirs, are linked to a 360/50 at Toyota's sales headquarters. The 360/50 is on-line with the company's manufacturing plants. Delivery time is reduced by transmitting orders to the factory via the 2780.

The test will be given again in October.

Successful candidates received their notification and a "membership card" Jan. 16, according to a West Coast consultant who passed. The names are kept on file at DPMA headquarters where, prospective employers can check on a programmer's achievement.

Although the test will be given annually, only one successful attempt is needed in order to be a registered business programmer, as is the case with the CDP.

## DP Hassle Taxes Colorado

**DENVER** — A proposal to levy off-computer spending by establishing service centers for state agencies and institutions is being evaluated by Colorado officials.

Commissioner of Administration Bernard Teets made the proposal in light of legislative concern over increasing DP budget and increasing requests for computers.

Teets has policy-making authority for computers, but funds are appropriated directly to user agencies. Therefore, Teets appealed to the legislature to retain that he has no real authority to establish these centers.

The administrator said the state colleges generally oppose the concept of service centers, fearing insufficient support and services, as well as a loss of funds.

"It's just not economical for everyone to have his own box," Teets related. He noted there is a question of "how much the state can do to support" the continued proliferation of computers and accompanying budgetary increases.

Colorado's DP budget for fiscal year 1969 was \$8.3 million. This year its bill is expected to run \$14.3 million, and the proposal for 1972 is for \$17.3 million, or, as a local newspaper pointed

out, more than \$8 for every man, woman, and child in the state.

Teets said that service centers, or one or two large computers with remote capability for instructional use, would be more efficient. He wants to evaluate their needs and he hopes to have additional recommendations for the legislature in early March.

## Users Choose Service Source

(Continued from Page 11)

tennis services.

The four companies also agreed to use Comus for the full range of other computer maintenance services, including reconfiguration and recommissioning (R&R).

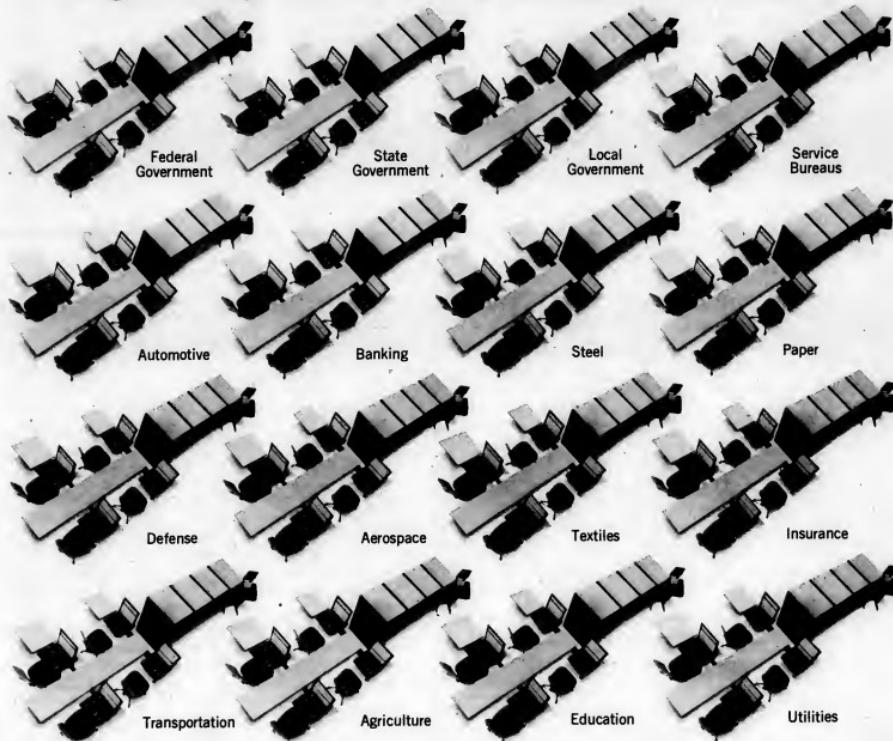
Details of the deal were not disclosed. The agreement was described as "long term."

Pader predicted other leasing companies would turn to independent, third-party maintenance firms, which will "soon become the big segment" of the computer leases.

Poppo agreed, calling the arrangement a "milestone in the development of the computer leasing industry." He said the "problem of computer maintenance" had been "under study for some time."

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## N.Y. OTB Not Off to Races Yet

**NEW YORK** — Offtrack betting on the ponies will remain illegal in this city for at least a little while longer because of a threatened labor walkout at Yonkers, a disagreement over who will pay \$1 million for the installation of a computer at Aqueduct, and purported "kinks" in the computer system.

Legal, computerized offtrack betting was supposed to begin here Jan. 11, and apparently the computer itself and the terminals where the bets were ready to go, but getting ODT's DP equipment into the race-tracks was another problem.

Under the New York City Off-Track Betting (OTB) plan, money bet on New York races would go into a central mutuel pool at the track whether it was bet at the track or through OTB, which requires terminals at the track to register the OTB bets.

Two different procedures are to be used.

At Yonkers Raceway, wagers would be removed from OTB by teletype power and input into the pari-mutuel system by hand.

At Aqueduct, however, the OTB's IBM computer would interface directly to the Aqueduct Honeywell computer.

But OTB has never come to an agreement with the tracks as to how these installations would be made. Neither OTB nor the New York Racing Association is willing to pay the \$1 million cost of the interface at Aqueduct, and purported "kinks" in the computer system.

At Yonkers, the pari-mutuel clerks have threatened to strike unless their union represents the OTB clerks. But the OTB clerks wanted a different settlement.

The Yonkers clerks get up to \$55 a night, whereas OTB clerks will only get \$3/hr — and the Yonkers clerks are afraid of losing their jobs to lower-paid OTB clerks if the OTB plan cuts track attendance.

With the N.Y.B. President Howard Samuels first announced the delay in the opening of the system, he placed the blame partly on "kinks in the computer."

But OTB officials now deny they have any such kinks, and claim only that Samuels wanted to ensure testing of the system did not cause the opening difficulties that accompany most new computer sys-

tems. The system is being developed by Computer Sciences Corp., based on the Compuicket system. One company spokesman called it a "panic program" with the entire job being done in only one month.

But OTB spokesmen say that the system will be up and running within two weeks of the installation of a computer terminal at Yonkers.

For the initial openers there will be only five betting shops, but 10 shops per month are planned to be added.

One of the initial shops will be in what used to be railroad ticket windows at Grand Central Station. Gamblers who make a deposit in advance will be able to place bets by telephone.

The system has already cost New York over \$1.5 million, but proponents hope that the system will produce \$2.5 million in tax revenue for the city the first year, and eventually up to \$200 million/yr. Bets are taxed at 17.2%.

The system will use dual 360/360 for the central processor and PDP-8s as data concentrators.

## News Wrapup

### Murder Victim Linked to DP

**DAYTON, Ohio** — A 24-year-old man, shot to death while on an errand for his boss, was to have become the vice-president of a small computer repair firm.

No yet to charges or arrests have been reported in the case.

The sheriff in charge said that the body of John L. Calkins had been shot several times through the back of the head with a large caliber pistol.

Calkins was reported to have been discharged from the Air Force last summer and had planned on going into business with another man to operate the D & Z Co.

Robbery has been ruled out because the victim's possessions were still on his body.

### Ethnic Opposes Recording of Ethnic Origins

**LONDON** — A Civil Service Union, representing 65,000 persons, is blocking an attempt by a government department to record the ethnic origins of workers on a computer.

The Inland Revenue Staff Association has told the Civil Service Commission that it does not feel there is any need to differentiate between members by ethnic origins.

The association has not objected to the computer recording age, sex or educational qualifications of Revenue workers.

### Computer May Check Recall Signatures

**JERSEY CITY** — An official faced with the task of verifying 150,000 signatures in 10 days is contemplating enlisting the aid of a computer service firm.

The signatures were collected by two separate petition drives seeking a recall election to remove from office Mayor Thomas J. Whelan and seven of the nine city councilmen.

City Clerk Thomas F.X. Smith has been advised by the election commissioner and the chairman of the Election Law Revision Commission that "there is nothing in the state laws that prohibit a computer." But even with a computer, Smith said he felt it would take longer than 10 days to go over the petitions.

### Toll Tallying, Traffic Counting Go Modern

**OWENSBORO, Ky.** — The Audubon Parkway will be the first partway in the state and one of the first in the country to use a new computer system to tally tolls and make traffic counts.

The system will enable personnel in the highway department's DP division to call the computer and learn in minutes a daily traffic count and a tally of tolls.

### British Speed Up Economic Forecasting

**LONDON** — To speed up and simplify its economic forecasting techniques, the Treasury has installed an IBM 1130 linked to an IBM 360/65 computer at the IBM Bureau here.

It is hoped that the new installation will lead to a "more comprehensive and efficient exploitation" of the Treasury's mathematical models of the economy. "For the first time those concerned with policy will be able to take part themselves in the simulations or trial runs."

Calculations and simulations had previously been done by "conventional batch processing methods at computer bureaus" and the equations had to be taken along with messages.

### Commerce Acknowledges 'Missing' Persons

**MANCHESTER, N.H.** — For what it's worth, city officials were correct when they claimed sections of Manchester were missed by the census takers.

An official of the Department of Commerce, which conducts the decennial census, said the "enumerator quit before he was finished" in one Manchester district.

The city's population count was increased by 411 as a result of the "miss," but an attempt to prove that Manchester's computerized count was more accurate than the Federal Government's human one failed [CW, Dec. 9, 1970].

The government official said such misses numbered "no more than about half a dozen" across the country. He stated many municipalities had their projections fall short, as the result of a steep drop in the birth rate early last decade.

### Poor Production Loses Job for Fair Carmella

**GRUNTHAL, Manitoba** — Poor Carmella! She seemed like the model worker, but in these tough economic times only the strong survive.

Or perhaps there was something about her sex life, some abnormal production for . . . But no, the company dismissed poor Carmella after she slaved three long years on the production line, and the reason given was a poor production record!

The management brought in a computer to analyze her work records and determine her production, her state of health and even delve into her mysterious sex life.

The computer predicted Carmella's performance as 17 index points below that of the other employees.

And so, Carmella, the Holstein dairy cow was laid off, the pounds on milk and percentage of butterfat melted away. It would be more profitable to sell her rather than feed her.

But weep no white tears for fair Carmella — even if she had a skeleton in her barnyard or even if her milk ran slow — she may have found her greener pastures.

## PMLI Home to 6 Vendors

(Continued from Page 1)

into the mixed vendor savings. By the third-party leases the company saved enough to bring in 256K, more core at no increase in budget.

On a straight lease are an IBM card reader, two tape control units, a printed circuit board unit and a printed IBM tape drive will be replaced shortly with Telex drives and eight Telex drives are now in operation. PMLI believes that plug-in compatibility is not enough since that the users have different peripheral incompatible.

A Century Data CD-14 control unit with five spindles, compatible to the IBM 2314, is in use and a second one will replace seven MAI 2301s. Three Sanders Communications terminals are used as the front end.

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There is a contract difference, however. Peripherals companies require a one-year lease while IBM has a 30-day cancellation clause. Garrison notes that some companies are now using 30-day leases to become more competitive.

Both men note that fluctuating demands, such as found in the aerospace industry, where units are added for peak loads and then canceled at down periods, make the one-year lease a costly restriction.

While the company uses the general Government guidelines for planning, it is not afraid to go beyond them. "We are very conservative," says Garrison. "We are now a computer center of many suppliers and we are in a growth mode."

Walter Matus, manager of the DP department, adds: "Vendors love to see others besides themselves in the shop. They don't pass the buck. And I personally would rather deal with maintenance men from four or five companies instead of just one."

Both men agree that IBM has never been really unreasonable. "We think they've been fair," PMLI's method of working with IBM was to discuss with them openly all changes they were planning.

Garrison points out that a mixed vendor operation is not unique in that every communica-

tions user is dealing mixed vendor since he has the telephone company and transmission equipment involved in his center.

Savings came to Pacific Mutual in more than price/performance costs. As IBM charges 100¢ for each extra program shift and PMLI operates two extra shifts, 20% was saved on every piece of non-IBM equipment, since the peripherals companies don't charge this way.

The recent elimination of overtime charges by IBM "for disk drives reduces some of this saving."

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2721 TERMINAL

IHC's new system is an inventory system on trucks, using IBM 2721 battery-powered terminals and is tied to IHC's sales offices.

An IHC sales district, or an individual IHC dealer, can interrogate the system housed in the divisional headquarters here and locate any given truck seconds.

Using the 2721, which can accommodate any standard telephone, an IHC sales outlet requiring a specific model, color, and type truck with any combination of accessories, can dial the telephone number of the system and receive a "printout" of the response by IHC—and obtain the location of the truck meeting the required specifications in, IHC says, seconds.

By Thomas J. Morton  
CW Midwest Bureau

**FORT WAYNE** Ind.—The International Harvester Corp. (IHC), motor truck division, has initiated a truck inventory program here and incidentally found another use for the IBM 2721 terminal.

IHC's new system is an inventory system on trucks, using IBM 2721 battery-powered terminals and is tied to IHC's sales offices.

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#### Audio Response Unit

The system, in two partitions of a 360/65, takes and transmits of a 1961 IBM 7770 audio response unit. When a sales outlet makes a connect, the system asks for an identity which is done by a key on the 2721. Further security clearance is required by the sales outlet giving an assigned code number, the truck number, the driver identification, truck identification, and other discontinuous, IHC says.

The interrogator punches keys on the 2721 for input, and voice is output, with a vocabulary of 128 words built into the system.

The sales outlet can then find the particular type of truck by numerics. When located, the sales outlet, IHC or independent distributor, can "hold" on that truck so the system will not release it on a later call.

The apparent cause was the 1970 tax audit for listing these individuals, a card for each person, with only a notation that multiple parcels were involved.

The firm contracted to compile the 1971 tax duplicate listed each property on a separate card.

A computer run matching the

IBM, in announcing the 2721 last year, said the terminal as a portable unit with applications for implant connection or out-of-property connections such as could be used by a field sales force.

IHC saw the 2721 as a "part-time" real-time terminal. IHC could not see the need for a terminal on a full-time connect or lease for its sales outlets since the terminal's use would be limited to two or three short connects a day.

IHC marketing people are delighted with the system, even in its present stage of only partial connect to the nationwide IHC sales force. The assistant district manager for the IHC New York office, R.J. Ratiff, claimed that in the short time the system has



The IBM 2721 battery powered terminal enables a company to maintain a presence in international markets. Harvester's computers in Fort Wayne and get an over-the-phone voice response on the availability of trucks with customer-prescribed accessories. been working in their territory, 78 trucks have been located in IHC or dealer inventories and sold with the "quick assistance of Audre."

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### The Computer Takes Bow When Media Miss Out

When newspapers in Cleveland, Ohio, and Provincetown, Mass., sought to include the computer in stories on "errors" and "goofs" in municipal affairs, it turned out that the news media wasn't even used in one case and in the other a difference in listing methods was the actual villain.

In Cleveland, a "computer goof" consisting of different input formats delayed the tax listing of Cuyahoga County by about a month last fall.

The county recently underwent revaluation proceedings, and the computer rejected 42,000 cards, representing taxpayers who owned more than one property.

The apparent cause was the 1970 tax audit for listing these individuals, a card for each person, with only a notation that multiple parcels were involved.

The firm contracted to compile the 1971 tax duplicate listed each property on a separate card.

A computer run matching the

two sets of appraisal cards resulted in the 42,000 rejections, or about 9% of the properties. The \$45,000 property tax due date is the total worth of the county's property taxes for tax purposes, or \$12.6 billion.

The Cleveland *Plain Dealer* headlined the "Computer Goof," but towards the end of the report the newspaper did "explain the cause as different methods used by the county and the firm."

What the Provincetown newspaper called "computer confusion" embarrassed town officials, who discovered that a \$15,000 figure, representing part of Provincetown's indebtedness, was omitted from the 1970 report.

A correction to the "computer error" will have to be included in the 1971 figure.

The assistant town accountant told CW there was "an error in the computer in the figure," but it was a "human confusion," since computers were not used in compiling the report.

### 39 Changes Urged for DP Voting

**PHOENIX** — A nonpartisan committee has recommended 39 changes to the computerized election system used in last fall's election.

Five of the changes have to do with software, while the others deal mainly with voter education and the processing of absentee ballots.

The five-member committee first recommended security to the voting system, which is "just as subject to tampering" as the application programs.

The head of the Maricopa County Democratic Central Committee, Mike Marrasch, who appointed the committee, emphasized that we "completely minimized that we got a good count." The committee was appointed to assure continued protection against error and fraud.

Other recommendations included audit of the programs

before and after the election by an outside firm, a "programmed comparison" between the number of ballots processed for each precinct and the number of good ballots reported by the precinct election boards, elimination of previous voter registration cards, and program control cards because of human elements (additional handling), and providing auditors with system control logs to assure that all programs used were in fact audited.

#### Steel Plant Analyzes Costs

**SHIEFIELD**, England—Dunford Hadfields is using a Honeywell 200 in an effort to reduce the cost of raw materials used in the manufacture of alloy steels. The system will provide a daily analysis of cost factors for the staff responsible for allocating resources, and will also be used for stock control.

## N.Y. Power Reserves Chilled

**NEW YORK** — It wasn't the heat, or the fuel shortage. Both of those problems seem to have disappeared.

It was the bitter cold wave that caused a 5% reduction in power throughout the state last week, as power reserves diminished to about 2%. The "brownout" lasted three and a half hours.

Most computer manufacturers estimate their equipment can withstand moderate power drops of 10% before damage, garbled data, or other errors might occur. Electric motors, such as those used in tape or disk drives, and in air conditioning units, are also susceptible to damage in low-voltage situations.

Consolidated Edison said that, in addition to the uniform brownout (probably too small to be noticed by most customers), selected major users were telephoned and requested to cut back on non-essential uses.

It was only the second time in history that New York experienced a January brownout, and the only other time was to assist an out-of-state power pool.

## Redistricting Schedule Delayed by Programmer

By a CW Staff Writer

**COLUMBUS, Ohio** — A programming error at the U.S. Bureau of the Census appears to have prevented departing Republican Gov. James A. Rhodes from approving a congressional redistricting plan.

Because of the current delay was a missing instruction in a program which told citizens to various census Block Groups, the census for redistricting.

A census official said that, in certain areas of large cities, the population count was conducted by mail, according to "strings of addresses."

Enumerators who collected information in person, however, were assigned territories by blocks.

## Police See Use for DP in Rehabilitation

By Edward J. Bride

CW Staff Writer

**KANSAS CITY, Mo.** — The local police department has a computerized system for tracking fugitives in two states for law enforcement and rehabilitation of convicted felons.

Twenty-eight of the system's 70 terminals are in the state of Kansas, which borders this city. Modeled after the FBI's National Crime Information Center (NCIC), the system is used in nature even within Kansas City, as portions of three counties are within city limits.

The criminal history file registers wanted persons, plus stolen vehicles and property, like NCIC. It also communicates with the computers at the state Revenue Department and the City Attorney's office, specifically requesting all but four of the terminals are in police stations.

The others are used by the courts and attorneys in the adjudication process, noted Col. James R. Newman, director of systems and assistant Kansas City chief.

Newman predicted that some day all elements of the legal process would be served by the department's IBM 360/40: the police and sheriff, the juvenile, magistrate and circuit courts, rehabilitation and detention centers, and probation and parole boards.

Newman said the system is

normally, Block Groups and enumeration districts coincide, explained Deputy Census Director Robert Drury, except in highly populated areas where part of the census is conducted by mail.

Converting the enumeration districts and "strings of addresses" to a common Block Group created a problem, since a missing instruction prevented the program from identifying some people in "strings" which spanned districts, or from assigning them to the proper Block Group.

Discovery and debugging took about two weeks. Drury related, enough time for the Ohio Legislature to adjourn and Gov. John J. Gilligan to take office two weeks ago.

Capable of expanding to handle up to 600 terminals, but after about 256 there would be a storage problem.

In current use, a policeman patrolling a neighborhood at 3 a.m. and spotting a "suspect" automobile, can first inquire of the city system if the automobile is stolen. If not, but if the policeman wants more information, he can request police headquarters to query the state Revenue Department for that information.

If that request has been convicted more than twice for burglary, but has been released to the public, and is again "cruising" in a residential neighborhood, the policeman has "probable cause" to stop and question him, Newman said.

The individual prior conviction record is stored in the police data bank, Newman continued, but to make the connections between the identity of the registrant and his police record, it would take the specific action of a police operator.

Newman foresees the local use of the computer to follow an individual all the way through the legal process from "original booking" and updating of status (arraigned, acquitted, tried, etc.), to probation, parole, and finally rehabilitation (or back to an earlier phase of the process).

He is extremely conscious of the phenomena of rehabilitation without detention, and said the

## Computers Add Strength to Radiation Therapy, Cytology in Cancer Battle

The vital fields of radiation therapy and cytology have received some needed assistance from computers in the fight against cancer.

Two computers will be incorporated into a powerful tool to categorize "abnormal" and "normal" cytological specimens used in the detection of uterine cancer in a pioneering project currently under way in the electrical engineering department at McGill University in Montreal.

The computers will be part of a system designed to improve the speed and accuracy of identification of abnormal cytological specimens.

"Each year, millions of women throughout the world are given a simple diagnostic test for uterine cancer," says project director Dr. Martin D. Levine. "In a procedure that involves the analysis of a smear on a slide. The number of women taking these annual tests has steadily increased in recent years creating a volume problem for the medical laboratory."

The McGill research team is attempting to formulate an automatic method for separating normal from suspicious slides, so that the major effort of the cytology laboratory can be invested in a more searching analysis of slides showing abnormalities.

An image digitizing system, called McScan, processes each smear directly on the cytological slide under magnification. Data from the microscope is digitized and processed by a DEC PDF-8

minicomputer. Additional and more detailed analyses are then performed by a DEC PDP-15 microscale computer.

Included in the system is a standard PDP-15/20 computer with 8,192 words of core memory, a bus converter, an interprocessor buffer and a PDP-8 computer.

### Radiation

Radiation therapy has also received a boost from a minicomputer-controlled automation package for the Varian Clinac models 4 and 35 linear accelerators.

The new system, Cart (Computer-Assisted Radiation Therapist), uses a Varian 620/l genera-

l-purpose digital minicomputer and standard accessories for storing each patient's individual treatment program.

Varian said the automation package offers tumor treatment centers faster setup times, capability for treating more patients per day, improved parameters, computer control of Clinac beam size and direction, and substantial reduction of the possibility of human error.

A feature of the Cart system is the convenience of an individual cassette for each patient. The cassette carries the patient's diagnostic history and treatment program, as prescribed by the physician or radiologist.

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**Editorial****One-Way Streets**

The problem with most computerized billing systems is that they are just that and no more. They are de facto programmed to ignore all complaints and problems and to single-mindedly collect the bills.

But why can't they be two-way streets? The vendor has all kinds of variables built into the system for his convenience, so why can't he make a few options available to the customer?

When bills are returned with payments, the information is entered into the system either by a keying operation or on some sort of form. It would be very little problem for the person performing this task to enter one or two additional characters in a special field.

Data for this field would come from a special section of the bill set aside for customer use. By checking the appropriate box, the customer could indicate such things as "merchandise ordered but not received" or "merchandise returned for credit."

Once a "customer problem" character was entered on the customer's record, the system could ride herd on it to see that action was taken within a predetermined period. And, most important of all, it could keep the customer informed.

On his next bill, instead of printing the typical "pay or else" message, it could print, "Your complaint about merchandise delivery has been noted. If shipment has not yet arrived, please subtract amount from bill and check below."

Depending on the critical nature of the merchandise involved, the system could initiate a trace after the first complaint or wait until the second complaint was received.

What the system does to solve the problem really is less important to the customer — and the vendor's public relations — than what the system tells the customer.

Nothing is more irritating than to have a human being at the vendor tell you that everything has been straightened out and then have the computer go right on dunning you.

**Letters to the Editor****Omissions, Errors  
Covered by Insurance**

The article "Let Customer Be Warned in Computer Contract" written by Edward Bride [CW, Jan. 13] was of great interest. Of special interest was his comment that insurance was now available for errors and omissions.

We are interested in securing

coverage, but so far, have been unsuccessful in finding an insurer.

Harry McColm

Engineering and Management Systems Corp.  
Los Gatos, Calif.

The article "Fire and Marine Insurance Co., St. Paul, Minn., has a Data Processing Errors and Omissions Policy, but coverage is restricted to liability incurred "out of the performance of data processing services for others," Ed.

"Johnny-come-lately" to the insurance scene and the only changes they have rendered are in the areas of reducing readability, understanding, warmth and personal injections. In other words, like everything else computerized, it becomes more rigid and cold.

Also heralded "automation" is nothing more than an extension and refinement of the machine age which made giant advancements before any of us were born.

Geo. E. Smith

President  
Los Angeles Typesetters Assn.

You and Strickland are making the same point, but in different ways, Ed.

**Lock of Sales Ability  
to Software Blamed**

In your Dec. 16 issue of CW you gave space to "Human Cry of Monopoly" and "Alarming Signs," both written by Philip Huggins. The latter was titled "Software Industry's Growth Hurts Immature User." It dealt mainly with the problem of the software industry's competition from moguls like IBM.

I take offense to this approach for reasons relating to both the author and Bauer. Bauer's entry in his best treatment of his industry's software is well written. It's not the problem of the immature user or the monopolistic IBM, but the lack of sales ability in the software industry that's hurt Bauer. When things were beginning, the software industry was growing by leaps and bounds and there wasn't an overabundance of DP school graduates.

He didn't have to worry about being a salesman. Now's the time when you have to sell. It's time to be bold and show off your competition or ask for federal controls to protect you. Get out and sell, if you have a product.

Russell H. Hutchins  
San Francisco, Calif.

**Federal Government's HUD Program,  
Afips Action May Offer Hope to Jobless**

**WASHINGTON, D.C.** — Somebody must have heard us — and others who have been clamoring for action — on the problem of professional people unemployed because of the economic recession.

In my column of Dec. 16, I discussed the unusual situation of the unemployment statistics of both the Federal Government and some of our professional societies. I singled out the American Federation of Information Processing Societies for its lack of awareness to industry needs evident at the Fall Joint Computer Conference in Houston last November.

Now, there are signs that both the Federal Government and Afips are getting away from their apathy.

The Nixon Administration is expected to make a decision shortly regarding a proposed plan to recruit unemployed aerospace professionals — including computer people — in an experimental retraining project.

The purpose of the project would essentially be to utilize these talents in other areas of need — such as urban planning.

A number of federal agencies have submitted suggestions for retraining out-of-work technical people, and one of the most interesting comes from the Department of Housing and Urban Development's Model Cities Division.

In short, HUD's program would recruit, screen, orient and place 1,500 aerospace professionals and 500 Vietnam veterans in available state, county and local government positions.

Over 35,000 unemployed aerospace technicians, according to HUD, are now in the labor market.

A large majority would opt to leave the aerospace industry for stable public employment; most would be willing to take a salary cut to do

so. Profile suggest an ability to select a sizable sample whose backgrounds reflect social science undergraduate degrees or relevant experience; general management experience and/or background in areas compatible with identified local government jobs, while in aerospace industry; urban avocation; and willingness to relocate, etc.

HUD is opting to implement its suggested program in March with the recruitment and ultimate placement of up to 350 people. Individuals would be selected from four or five of the areas hardest hit by aerospace employment. Potential employers would come from Model Cities and from with Model Cities states with Model Cities.

The cost per person for the (program) will approach \$4 million or approximately \$2,000 per participant," adds HUD.

Meanwhile, Afips is planning to act, too. Dr. Jack Mothman, general chairman of the 1971 Spring Joint Computer Conference to be held in Atlanta, City, N.J., said that Afips is going to take a leadership role in aerospace and professionalism. He also discussed a charge of inertia leveled at the society by John Dublin of Computer People for Peace in a letter to this writer.

She wrote that the organization had sent a letter to Mothman "in October, requesting that questions of unemployment and lay-offs be addressed at the Spring Joint Conference. In November we received a letter from him stating essentially what your (Dec. 16) article outlined. I quote Mothman: 'I am sure you must realize that the organization of a meeting of the size and complexity of the Joint Computer Conference requires a certain adherence to schedules and timetables... in short, although we requested a modification to the SJCC the changes were turned down due to time requirements.'

Mothman explained to this writer that he offered CPP the opportunity to organize its own meeting and that Afips would provide space at the Convention Hall for it. The topic, Mothman said, was left to CPP.

I was pleased to see Malcolm Steifel suggest in his facilities management article on Jan. 13 that Brandon Applied Systems, Inc., among others, might well enter the facilities management market. In principle I agree with him.

However, I am not yet completely convinced that facilities management is a viable business long-range, much as I feel about computer leasing and time-sharing. While the industry is suffering from severe management problems, it is entirely feasible to consider facilities management as a solution. However, I am willing to bet that most top management would rather have direct control of their most vital resources. Thus I doubt long-range viability. Of course, I have been wrong before.

Dick H. Brandon  
Brandon Applied Systems, Inc.  
New York, N.Y.

**What Does Language  
Owe to Computers?**

Art Strickland's column "Language Owes Much to Computer" [Jan. 13] is a welcome addition to the column that compelled me to rebut his statements. Even if Strickland was being satirical, he is way off base in claiming for computers the change in the English language.

Computers are only a



## Human Activity Slowed by CO

MILWAUKEE, Wis.—Preliminary test results of a computer-aided research study at the Marquette School of Medicine show carbon monoxide in heavy traffic or smoggy conditions slows down the activity of volunteer test subjects to a marked degree.

Researchers are exposing the subjects to increasing levels of carbon monoxide for up to 24 hours.

Dr. Richard Stewart, environmental medicine department chairman at the school, says people exposed to high carbon monoxide concentrations for several hours develops a headache, loses manual dexterity and has a noticeably longer reaction time to stimuli.

Using the IBM 360/40 to pinpoint levels at which CO and other chemicals impair people's health, the study aims at providing information to aid in the formulation of air pollution control standards.



A volunteer's ability to exercise while breathing various levels of carbon monoxide is evaluated by a computer-aided research study. An IBM 360/40 computer analyzes data from this and other tests at the Marquette School of Medicine.



Ira Schonfeld and Tom Seiter work as a computer project prepared by the Epic Junior Achievement Co. It is based on a Univac 9300 at the Univac Division headquarters in Blue Bell. The Epic JA group worked through the summer.

## JA Students Fit Into Program

BLUE BELL, Pa.—A group of Norristown high-school students, who decided to give up their summer vacations to develop computer programs under the auspices of the Junior Achievement (JA) organization, have acquired DP training as well as business experience.

In June, 11 students—all juniors or sophomores—decided to complete three computer programs they had already started for the Univac Division of Sperry Rand Corp.

They named their venture the Eagle Programming Imperial Co. (Epic).

Normally, JA groups sponsored by local companies, which provide adult advisors, make such products as ceramic dishes and lamps, and sell them to relatives, friends and employees of the sponsoring companies.

### Minitaire Company

Epic JA group operates as a miniature company, complete with executive officers, financial statements with detailed figures on costs, sales, net earnings, etc.

When Anthony Anderson, a Univac software specialist with Univac, decided high school students could be taught to program, he contacted Armand Adams, Univac's community relations manager. The supervisor of the Delaware Valley JA staff and the faculty at the AD Eisenhower High School in Norristown, as well as Univac employees was enlisted.

Following two and a half months of theoretical and practical hands-on computer experience from the Univac advisors, the Epic group put together written proposals outlining specific features of the three programs they were planning to undertake for Univac. The proposals included price and delivery schedules, and were accepted.

### Three Projects

The group organized into three project teams. Roland Bell headed project Mat, Fred Hartman was in charge of project Stat, and Ira Schonfeld led project Plot. Each project was designed for the Univac 9000 series.

Mat is a Report Generator Program for performing business applications on the Univac 9200 and 9300 systems. The program is compatible with a program of the same name developed originally for the Univac 1004 computer.

Stat is a statistical subroutine package adapted to the requirements of quality control applications in industrial production situations and Plot is a general plotting program with histograms for the Univac 9200 bar printer.

When it was clear that the programs could not be completed by the end of the summer, the students agreed to continue the work on Saturdays to fulfill their contractual commitment. Programs were tested and debugged on Univac computers at the Univac Marketing Education Center and on a Univac 9200 operated by the Norristown Area School District.

## UK Tire Maker to Use Computer for Control

STOKE-ON-TRENT, England—One of England's first applications of on-line computer systems for the rubber industry will be installed by Insteam Ltd. at Michelin Tyre Co. Ltd.'s new plant here.

The system will use a DEC PDP-8/L computer to control the plant, the process sequence, and delivery of materials. A second PDP-8/L will be used as a standby.

Insteam is undertaking overall design, programming, and assembly of the equipment at its factory at Stone.

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**Random Notes****Conversion Service Produces ANS Cobol**

CHERRY HILL, N.J. — A conversion service that includes testing and documentation is available from Computer Dynamics Corp. (CDC). It includes the ability to convert Autocoder to Cobol, or "second generation" Cobol to ANS Cobol or Fortran as required.

CDC uses a combination of automatic and manual conversion techniques so that "all" conversion problems can be handled.

The service costs \$1/source card from 401 Cooper Landing Road.

**Paden Runs Payroll For Food Companies**

DALLAS — A payroll service specifically designed for small or medium operations in the food service industry is available from John K. Paden Co.

The system is said to particularly useful in handling the rapid personnel turnover characteristic of the industry. In addition to standard monthly payroll checks and weekly information, the system also produces the quarterly 941-A and annual W-2 forms for the user. Paden is at 5838 Live Oak.

**Bank Transit System Handled by Package**

BOSTON — A proof and transit system for banks called Shawmier is suited to high volume use, according to its distributor, Culver Systems Inc. The system fits into a 20 K partition and permits use of dual partitions and entry from two 1419 Mier sorters, for faster processing.

Shawmier was developed by the Shawmut National Bank here. It includes separate programs for each of the steps in the transit process, and utilities to print the Mier documents and create or update files on either IBM 2311 or 2314 disk units. The system costs \$25,000 from One Boston Place.

**Computeria Installs 'Mail' on T/S Nets**

BRAINTRE, Mass. — A time-shared service called Mail is used to process selective mailings from a master file containing company codes, names, addresses, individual names and titles. Distributed by Computeria Inc., Mail allows user-defined selection criteria including SIC numbers, Zip codes, codes for company, titles or functions. It provides for the printing of listings, labels, envelopes or letter headings on Typewriter or mixed upper/lower case font terminals. Computeria is at 14 Wood Road.

**Wholesalers Can Use Accounting Service**

BLUE BELL, Pa. — The Datafile/500 time-shared service designed to provide data processing for companies in the wholesaling industry is available from Datafile Systems Corp.

The service provides invoicing and a range of accounts receivable, inventory, sales and profit reports. The service can automatically adjust re-orders, prints to checking ledgers and balances the company's cash. The firm is at 1777 Walton Road.

**Programming Eased by 'Force' Macros**

**NEW YORK** — Most 360 commercial programming problems can be handled with a language called Force, according to the developer, Data Force Inc. (DFI).

Transition from any of the commonly used 360 languages is said to be "virtually painless," since Force includes the equivalent of (in Fortran) Cobol, the machine efficiency and core utilization of BAL and the matching and table-handling logic of RPG, DFI said.

Force's relationship to the older languages is further emphasized by the fact that the user may intermix them. Both BAL and DLI source code, for example, can be easily assembled on say IBM assembler (level D and up) without any further use of Force, the company said.

Force commands are closely akin to Cobol in content and meaning. Force includes the PERFORM statement, which the "varying," "until" and "times" options, in addition to IF, with both relation-tests and condition-tests. MOVE

and GOTO. It also includes a PICTURE clause, used with an edit instruction for report formatting.

The syntax of Force is identical to that of the instructions in 360 Assembler Language. There are op-codes and parameters, both key word and positional, so that compound operations can be described in a minimum of coding.

Force can handle one card reader, one card punch, up to 10 printers, 10 tape

files and 10 disk files. The disk files may be one either 2314 or 2314 units, with a maximum resolution of four interchangeability between the two types.

Force can be purchased for \$16,000 plus \$50/mo for program maintenance, updating and education. The language is also available for \$100/mo plus \$2 for each of the first 100 compiles each month. Data Force Inc. is at 875 Avenue of the Americas.

**Helps 360 Users****'PMS' Checks Peripheral Speeds**

**MIAMI SHORES, Fla.** — How fast do peripherals actually operate? Do they slow down and extend date processing time?

Most 360 users can't answer such questions. The peripherals are now too fast or erratic for visual checking, and the computer contains check accuracy, rather than speed of data transfer. But users of the Peripheral Monitor System (PMS) from Computer Efficiency Corp. (CEC) feel that they have the capability to accurately monitor their 360 peripheral equipment.

PMS is a stand-alone software package that compares the actual operating speed of the peripherals to their rated speeds, and reports variance to the user. The comparison is based on a table of values for each peripheral, built into the program. This table can be extended to include any known specifications, CEC said.

In one PMS test, a user found that his line printer, rated at 1100 line/min actually operated at only 800 line/min. The printer was replaced.

In another test, the disk drives operating 30% and 46% below manufacturer's specifications were identified using PMS.

The flexibility of the PMS table approach has been used by some users as a way to determine which manufacturer's peripherals to install when upgrading their system.

One user told CW that his need to get disk drives which to have three major hardware changes was his main justification for getting PMS.

The maintenance capability provided by PMS was the main advantage cited by another user.

The system takes 15 seconds to monitor a peripheral and those who use PMS for normal monitoring apparently run it several times a week.

The package operates on any 360 and does not require any operating system support. It is available from CEC, 9999 NE 2nd Ave., for \$4,000.

**NBS 'Speed' Plots Sensor Data**

**WASHINGTON, D.C.** — Users can manipulate and display data from frequent sequential scans of up to 120 laboratory sensors with a Fortran IV program called Speed, available without cost from The National Bureau of Standards (NBS).

Speed is an acronym for Systematic Plotting and Evaluation of Enumerated Data. The program contains 11 subroutines and operates in three phases, called Plot 1, 2, and 3.

Plot 1 produces printsouts of data before and after processing, and also plots datum points. The input is usually on magnetic tape that has been transcribed from paper tape encoded in the laboratory.

Plot 1, produces a graph of readings from each sensor against the readings of

an independent variable, such as a clock or an instrument measuring applied force.

Plot 2 manipulates and combines readings of instruments to create new data classifications which are also plotted. It uses the matrix of data formed in Plot 1, NBS said, but can also accept raw data encoded on punched cards.

Plot 3 uses proprietary software to draw any of the plots obtained in Plot 2 in high quality graphs, suitable for printing.

Speed has been implemented in a Univac 1108, and since it is written in Fortran IV, adaptation to any other processor should be relatively simple, NBS said. Inquiries should be addressed to John M. Smith at the NBS Research Division, here.

**T/S Network Lets Users Shift Processing to Non-Prime Time**

**HOUSTON** — The Computer Complex Inc. time-sharing network now has a deferred processing option for operations that can be put off until non-prime hours at the Houston computer center.

Deferred processing is an extension of the previously available remote processing capability which allows the user to specify commands to be executed immediately after he disconnects from the system.

The deferred processing capability goes one step further and allows the user to take advantage of time efficiencies gained by running his programs during low usage periods. Output from the deferred processing run may be stored on the computer's magnetic disk file for examination and evaluation at the user's convenience.

Computer Complex supports Basic, Fortran II and IV, and several interactive debugging, editing and simulating packages.

The system can be accessed by local lines to 21 Computer Complex offices, or through nationwide In-WATS service.

Computer Complex Inc. is at 6400 Southwest Freeway.

**Package Generates 1099 Forms for IRS**

**SAN FRANCISCO** — A package of programs, System 1099, intended to aid accident and health insurance companies to comply with IRS requirements is available from American Information Development.

The system, priced at \$1,800, allows companies to collect information regarding claims payments to health care providers on a continuing basis throughout the year. American Information Development is at 2134 Van Ness.

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By Don Leavitt  
CW Staff Writer

Tariffs that allow sharing of data channels have spawned at least two brokerage operations aimed at providing the communications user "significant savings" over the cost of unshared lines.

Both Systems Architects Inc., Randolph, Mass., and Communications Facilities Exchange, Ramsey, N.J., expect to help build active user groups. They plan to bring together prime users with surplus channel capacity and prospective users who could operate on such available lines.

Some tariffs, such as Bell's Series 11,000 offering, do not allow the sharing of multiplexed data channels. Other tariffs have been called for by the Federal

Communications Commission in connection with its recent decision to ban rate stacking available on all Telstar users.

Each broker, in addition to bringing users together, will provide software-based support services

charges they might otherwise be billed.

SAI said that the rate schedule for an FX line, for example, starts at about \$3.30/mi, but a user can pay as little as thirty six cent/mi for the same service on Telstar D under a sharing arrangement.

The savings under the shared-use tariffs apply only to the mileage charges, however, and not to "termination charges."

Each user in a group is still responsible for the terminals and interfacing the terminal with the Bell network.

Some tariffs such as Bell's 260 require fixed charges "per terminal," so that more complex networks would have heavy surcharges.

Each of the brokers indicated that they expect to be able to create user groups anywhere in the country.

**Communications**

The brokers will not be part of any user group and participation would be determined by direct negotiations among the users. Brokers fees would be based on the amount of money that shared usage saves the user, a percentage of savings.

By grouping together, users apparently can save substantially on the inter-exchange mileage

carriers in providing data transmission services to computer users.

London, England — The slow rate of the world's common carriers in providing data transmission services to computer users, will spur the growth of private incompatible data networks. This view was expressed by data experts attending a session on computer networks held here recently.

By the mid-1970s common carriers

services are available, computer users will have mastered the problems connected with private systems and they will be reluctant to change their facilities according to D.G. Holloway of Plessey Limited, UK.

James Martin of IBM also stressed the importance of public data services. They would be used, revolutionize corporate communications by making possible full integration of systems on an international scale. Functional networks within companies had tended to evolve separately, superimposed on each other with little interconnection and infrequent rationalization, resulting in mixed systems, he said.

The need to rationalize corporate computer data networks had now become an urgent priority, yet everywhere the process was held up by the slow development of public transmission services, Martin said.

Public data trucks, such as Datron, and a nationwide teleware "backbone" across the United States, were a force for centralization, with computer sites being drawn to main transmission lines sending or receiving data from remote terminals at insignificantly low tariffs, Martin said.

The advantages that can accrue from nationwide common carrier rates were described by V. Hensel and S.M. Ornstein of Bell Telephone and Newman Inc. They described the 50 kbit/sec ARPA network linking 20 major projects at universities and research sites across the U.S.

The session was part of a state-of-the-art lecture series being held in Europe by Infotech Ltd. of London.

**FCC Stalls Increase Requested by AT&T**

WASHINGTON, D.C. — The American Telephone and Telegraph Company has been requested by the FCC to postpone the effective date of its proposed increases in long distance telephone service pending outcome of an expedited hearing. The rates were to become effective January 1, 1971, and would have affected some data users (CW, Dec. 21).

AT&T had asked for increases totalling \$545 million. The commission gave the company special permission to file for lesser rate increases which would produce \$250 million in additional annual net earnings.

In a letter to AT&T, the Commission stated that the rate increase originally proposed would have brought the carrier a rate of return that "far exceeds" the rate of return previously deemed acceptable by the commission.

The commission said that it intended to proceed with hearings so that it could conclude the matter "as expeditiously as feasible."

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January 27, 1971

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**Bits & Pieces****Minicomputer Price Dropped 10% by HP**

PALO ALTO, Calif. — The price of the Hewlett-Packard 2116C minicomputer has been cut about 10%. The change comes in 2000-series time-sharing configurations based on the 2116C, HP said.

The cut, is expected to reduce the price of a "typical" system from \$50,000 to about \$44,000, an HP spokesman said. This would include a plotter and/or disk units in addition to the minicomputer itself, he said.

**Tycam 20/20 Can Be Used As Typewriter or as Terminal**

POMPONIUS, N.J. — A Selectric-based typewriter for the Tycam Model 33, end 35, the Tycam 20/20 from Terminal Equipment Corp. can be used as typewriter as well as computer terminal.

The 20/20 consists of a Selectric typewriter, a baseplate for automating the typewriter, an acoustic coupler, and a logic console for control.

License prices start at \$75,00/mo. including the typewriter, with maintenance costs estimated at under \$20/mo. The device will be available in April from 750 Hemburg Turnpike.

**User Gets Lifetime Guarantee With 'Media' Magnetic Tape**

RESTON, Va. — A user will never have to purchase replacement magnetic tapes for his computer under a guarantee offered by General Kinetics, Inc., with its Media tapes.

Guaranteed for life, the tape is returned to the company for rehabilitation if it fails. For a charge of \$5.50, the tape is either restored to original specifications or replaced with a new reel.

Media tape is certified for 3,200 bpi/in. operation and is compatible with all current computer systems, the firm said.

The price of 1,600 bpi/in. tape in a 2,400-foot reel is \$13 and it is available on a 48 hour delivery from 11425 Isaac Newton St., South.

**Polyester Core Strengthens****Tab Cards for Heavy Duty**

FAIRFIELD, R.I. — A polyester and paper laminate that offers extra strength and tear resistance could be used to increase the life of tabulating cards in severe environments.

Designed for use where rough usage and difficult atmospheric conditions are encountered, Astro-Core by the Chase Foster division of Keene Corp., has characteristics that go beyond paper in tear strength, dimensional stability, and crease and moisture resistance, the company said.

While conventional card stock can be used 600 times, cards of Astro-core can be used 5,000 times.

**Device Reads Kimball Tickets**

SAN LEANDRO, Calif. — A Friden device that can read Kimball retail merchandise tickets at the point of sale, the Model 705 is designed for use with the company's Modular Data Transaction System (MDTS).

The Model 705 Merchandise Ticket Reader is priced at \$950 and will be available next summer from 2350 Washington Ave.

**Stand-Alone Systems Cheaper****Minis Create Uses for Voice Response**

By Frank Piatta

CW Staff Writer

Many users of computer systems are beginning to look to voice response systems for applications that were not previously practical due to the high cost of online equipment.

The breakthrough has come about with the introduction of minicomputer-based standalone voice response systems from a number of manufacturers.

These new systems offer the user most, if not all of the capabilities of larger on-line systems without taking up valuable mainframe time on his computer.

The user will have to make a choice,

however, between the systems that offer a large vocabulary and those that are limited to a relatively few number of words.

The user who favors a system with a relatively small vocabulary may argue that all of his applications can be implemented at lower equipment cost. Inventory control systems can be done with 64 words, while a credit checking system needs no more than 32, according to one source.

Other applications within the 32-word vocabulary level are real estate listing services and airline flight status reports, users say.

These apparently small vocabularies are useful because of the almost infinite numerical data that can be conveyed with only 10 digits. If properly planned, an application need add only a few key words to convey almost any data, according to the suppliers of voice response systems. So, say the big vocabulary proponents — there is insufficient security in just allowing numerics to be used to identify a transaction, they argue. Alphanumeric data should be added to the vocabulary, they say.

For instance, if a doctor called an audio-response system to get medical information about a patient, shouldn't he expect to hear more than a confirmation of the patient number that he keyed? The patient's name would confirm that he had the right person.

This type of application requires another feature — quick and easy vocabulary changing techniques that will allow the user to record and delete the obsolete words at his own site.

Under the patient information system, new patients would have to be entered, and former patients "deleted" the same day that the events occurred.

This type of application does not lend itself to the common routine in audio response systems to call for the manufacturer to make the vocabulary changes for the user. One manufacturer, at least, Periphonics Corp., is offering a system that allows the user to record and delete the vocabulary in much the same way as a tape recording.

**Numbers, Special Characters Can Be Read by OCR Device**

MORRISTOWN, N.J. — A low-cost OCR reader from Orbital Systems, Inc. is available in both on- and off-line configurations.

The Orbit I is designed for the processing of turn-around documents in such industries as insurance, banking, and publishing and can process up to 120 documents/min.

The unit can read any one of three fonts, OCR-A, 1428, or 12F, but the vocabulary is limited to numerics and four special characters. The company is scheduled to add three more fonts, E13B,

7B, and OCR-B, in about nine months, a spokesman said.

The reader will be sold with an interface for a key-to-device, the firm said.

Units to adapt the Orbit I to general-purpose computers, such as the IBM 360 and Univac 1108, and the PDP-8, are being developed.

The reader will sell for \$21,800, with a lease price of less than \$1,000/mo. Delivery is 26 weeks from Fellowship and Church Roads.

**PDP-11/20 T/S System Handles 16 Terminals**

MAYNARD, Mass. — A time-sharing configuration of the PDP-11/20 that includes a new Basic compiler is available from DEC for under \$5,000 per terminal.

Called the BTSS-11 (Batch Time-Sharing System), the system can support as many as 16 simultaneous users and costs \$49,900. This price includes one local terminal and the interfaces for 16 remote terminals.

The system includes a 16K word CPU, an ASR33 teletypewriter, a disk storage unit with a capacity of 256K words, magnetic tape, ROM, real-time clock, and 16 Teletype interfaces.

The multi-user Basic compiler includes an extended character string handling capability, it allows operation of up to 16 programs in memory, and the compiler can support a range of peripherals that allow a user to build and access his own on-line data files.

Basic programs written for other computers can be run on the BTSS-11 system with little or no modification, DEC said. Other features of the compiler include: the ability to use three types of data, floating-point, integer, and character strings; the ability to segment, chain, or overlay programs; and the ability to use complex FOR statements and arrays.

First deliveries of the BTSS-11 are scheduled for April, 1971.

**Tracer Cuts Disk Prices****To 15% Below IBM's 2319**

AUSTIN, Texas — Priced 15% below IBM prices, the Tracer Data Systems TDS-733/833 is the lowest priced system yet announced as an alternative to the IBM 2319 for 360 disk users.

The Tracer systems are available in one to nine spindle configurations allowing the disk user to acquire the exact number he requires, the company said.

For a controller and two 2314-type drives, the Tracer price is \$2,108/mo. A six-spindle disk system rents for \$2,958/mo, and nine spindles for \$3,808/mo. In contrast, a nine-spindle 2319 system from IBM is priced at \$4,480/mo.

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Applications vs. System Support

# User Should Recognize Different Types of Software

**By Don Levitt**  
cw staff writer

Two distinct, if complementary, types of packages fall under the general word "software." In a real understanding of the distinctions could be important to the user.

Unless he has an appreciation of the differences between applications systems and system support packages, he may well miss out on opportunities.

System support ranges from operating systems, language processors, and generalized information retrieval systems to conventional utilities such as sort/merges. Although often tied to specific hardware, these "tools"

are not limited to particular applications.

They are, instead, intended to aid the user in his overall operations and are essentially transparent to the non-EDP people who see the installation from the outside.

Applications systems, by contrast, are highly visible to the computer user. These are the packages that handle a particular DP chore, from input to output.

The cut-over to a new application may involve a change in form for order takers and stockroom clerks.

Although applications are increasingly being designed so that

the output of one becomes the

input for another, individual programs within an application are not directly used under other applications.

Almost all users need some system support packages to function at all, and they are willing to get them from outside sources. Users are not always able, however, to justify the purchase of application packages. Factors beyond the package's capabilities may well dictate against its acquisition.

As one user explained, the situation might well be one of the user's applications "as is." He needs payroll or accounts receivable processing, but he has

neither the manpower nor the skill to build the systems himself.

Here the packaged application serves a need, even if it does not do the job exactly the way the user might have done on his own.

A large-scale installation

might also go to a packaged application, with the understanding that the package has to be modified.

The large user, who has the manpower and the skills available for modification and maintenance effort, but doesn't tie his staff down with the chore of writing the basic application logic from scratch.

The installation that is moderately sized doesn't necessarily have this option. Management wants more than the package "as is" can provide, but the staff can't afford the time to learn the package logic thoroughly enough to make the modifications and the staff could better spend its time building a system that it

understands thoroughly, rather than trying to understand and then modify someone else's logic.

In any case, before a package is bought and modified, the user should do a complete system study so that he knows what he expects to accomplish with the application.

Assuming that a user chooses to buy a packaged application and has no system study, he then has to find the package that comes closest to fitting his proposed design.

The user, on the other hand, can be free in his search. Though his hardware forms a rather definitive constraint on his choices, application system designs do not.

The DP manager interested in looking for help in this area can use a "supermarket" approach. He can see what is available and get individualized advice on the basis that they should prove useful in his overall operation.

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# Standardized Cobol Compilers Give User Flexibility

By Harry T. Hicks Jr.  
Special to Computerworld

The new standard compilers allow the Cobol user a greater degree of flexibility than previously available. He can write programs in a dialect that maximizes program transferability, minimizes his current conversion effort, or any number of other permutations.

To utilize this flexibility to the utmost, the Cobol user must examine his objectives and consciously choose his own subset accordingly.

This past year was the year of the standard Cobol compiler. Compilers implementing the standard began appearing early in 1970, led by IBM's OS and DOS ANS Cobol compilers. By year-end, all major hardware vendors had at least announced, and several had released, standard compilers for their most popular lines of equipment.

## New Structure

What is a standard compiler and how does it differ from its predecessors—compilers based on Cobol-61 or Cobol-70? ANS Cobol imposes on Cobol a structure different from its traditional divisional organization.

This new structure recognizes the various functional capabilities of the language: nucleus (internal processing), table handling, sequential I/O, random I/O, report writer, sort, segmentation, and inquiry.

Each functional module is further divided into two or three levels of increasing sophistication. Lower levels of a particular functional module (mid and low table handling) are proper subsets of the high level of that module.

The standardization process considered all the elements of Cobol-1965 (plus a few extensions added after publication of that document), eliminated some on the basis of screening criteria (usefulness, redundancy, etc.) and allocated the remainder to one or more of the functional modules at the appropriate level.

The standard specifies a minimum dialect that any compiler claiming to be "standard" must implement. This dialect consists of the lowest levels of each functional module.

Since the low levels of all but three modules are empty, this minimum equals low nucleus, low table handling, low sequential I/O. Any standard compiler that claims a capability greater than this must implement the entire standard module which contains that capability.

The chart compares new ANS Cobol compilers on the basis of their implementors' reference manual implementation. The entries in the table indicate the level of each functional module implemented in each compiler.

An additional column indicates an extension that is likely to receive wide implementation: interprogram communication, which is a recent Cobol feature that is certain to be included in the next revision of the standard.

All the compilers surveyed implement the standard minimum standard Cobol. The only function not widely implemented is report writer, which is a valuable feature worthy of wider use than it has received.

One immediate effect of standardization can be best illustrated by one company's experience in comparing compilers. In 1968, a Cobol compiler comparison report that developed six Cobol compilers was developed.

This comparison required more than 40 pages of tables because the compilers surveyed were developed at a time when implementors could choose their dialects on an element by element, clause by clause basis.

Thus, while all six compilers implemented a common subset, their total dialects were quite varied. In contrast, the chart compares eleven compilers in the space of a single table!

## Extended Versions

The majority of these compilers are new versions of existing compilers, extended so that each feature now contains all the

Compiler	Features	Nucleus	Table Handling	Sequential Access	Random Access	Report Writer	Sort	Segmentation	Library	Inter-Program Comm
IBM ANS Cobol		High				High	High	High	High	Yes
IBM ANS Subset Cobol		Mid					Low	Low	Yes	
Honeywell GE 800		Mid*				High	High	Low*	Low*	Yes
H-2000 Mod 4		High				High	High	High	High	Yes
DEC Century Series II		High					High	Low		
NEC Century Stage III		High		High		High	High	High	High	"
2620/2630		High		High		High	High	Low		
Univac 1108		High		High		High	High	High	High	Yes
CDC 6000		High		High		High	High	High	High	Yes
CDC 3000		High		High		High	High	High	High	Yes
Spectra 70		Mid				Low	Low	High	Yes	

\*Implementation of the high level is planned

Comparisons of ANS Cobol Compilers

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(Continued on Page 5/4)

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# New Compiler Brightens Future for PL/I

By Don Lewitt  
CW Staff Writer

The PL/I language has given users a mixture of problems, promises, and potential over the last year and a half in the early days of the 360.

It wasn't known as PL/I at first, and perhaps that is typical of the language. The original name was to be New Programming Language, but the abbreviation NPL was already being used.

**Diseadvantages**

The problems have ranged from unavailability of the lan-

guage processor to finding that a shift from Assembler to Fortran to Cobol-like coding imposes a variety of difficulties on the requirements of the user compared with simpler processors.

If PL/I coding is clumsy to some users, its slow compilation speed and high-core usage are considered even more serious faults by others.

The generated code generated by the Cobol compiler for address register loading and PERFORM coding appears to be carried even further in PL/I.

But, if the language has its problems, it also has its good

points, which were stressed by those who have used PL/I heavily.

The ability to move from Assembler to Fortran to Cobol, as appropriate for the immediate situation, is well worth any problems, according to the users having highly complex application programs.

Besides that, the Fortran included in PL/I has features richer than those in the "standard" Fortran processors.

The fact that PL/I presently is strictly an IBM language is a very definite limitation in the eyes of those who are concerned about

the problem of transferability from one system to another.

There are indications, however, that some manufacturers are at least exploring the possibility of implementing PL/I compilers on their machines.

Meanwhile, IBM itself has faced up to some of its processor's shortcomings. It has announced an Optimizing compiler for use with PL/I.

The PL/I Optimizing compiler provides the user with three options: fast object program execution, reduced object program core requirement, or fast compilation.

The Optimizing compiler is said to include default options for use during coding, which are even stronger than the options already available under PL/I-F. The DOS user will be able to use PL/I-F level language capabilities, while using the Optimizing compiler. At the same time, the OS/360 user is expected to gain support for the time-sharing option.

The new Telecommunications Access Method (TCAM) is also supported by the Optimizing compiler, written for DOS PL/I-F or the OS PL/I-F compiler. In general, produce identical results when compiled by the Optimizing compiler.

Optimizing for fast execution may save between 25% and 40% in execution times, according to IBM estimates.

Object space savings can range from 10% to 20%, if the object program size option is chosen. A set of subroutines, the PL/I Reference Library, is required during the link-editing of a compiler output module. Another set of subroutines, the PL/I Transient Library, is required for execution of the object program.

Monthly charges for the compiler depend on the user's operating system. Under OS or DOS will be about \$250. With the new program products, the potential of PL/I apparently will come closer to reality, but at a significant cost.

## Standard Compilers Mean Flexibility

(Continued from Page S/3)

language elements required by the standard. In some cases, entire new functions have been added to bring the compiler closer to full standard Cobol (the highest levels of all modules).

Despite the order implied by the chart, none of the vendor's Cobol reference manuals display a solely standard implementation. The standard is there alright, but it is surrounded by numerous Cobol elements that are not standard.

These elements, called extensions, are needed to carry Cobol implementation. They are legitimate in the eyes of the standard, and are included for a variety of reasons.

Some elements are left over from the preceding version of the compiler, since the process of compiler extension to meet the standard was sold and matched by a corresponding deletion of existing non-standard elements, except where they were in conflict with the standard.

Others, such as the interprogram communication feature, are new Cobol elements that have not yet been exposed to the standardization process and

are included by the vendor in anticipation of that event.

The majority, however, are inventions of the vendor that enable him to keep his implementation more efficient with respect to his particular computer and related software.

The majority of these extensions will have some impact on program transferability; major extensions like non-standard random access methods may cause major rewriting if a transfer to a different vendor's compiler is made.

Once an extension has been identified, deciding whether to use it or not is another difficult problem that must be answered by each installation based on its needs and objectives.

Cobol users face some degree of conversion effort in order to utilize these new compilers. This effort may consist of simply teaching programmers the new features available, but more likely, it will include program conversion.

The extent of such a conversion depends on several factors, among them the degree to which the user's present compiler deviates from the standard, the number of non-standard elements the programs contain, and how close to standard the user

wants the converted programs to be.

A greater effort now will result in more nearly standard programs that might never need to be converted again.

Implementation whose pre- and post-processor will require program conversion will probably provide help to their users in the form of a dialect translator. For example, IBM offers a language Conversion Program (LCP) that automatically converts a large portion of Cobol D, E or F programs to ANS Cobol, and flags those statements that require further attention.

These implementor aids will undoubtedly insert non-standard extensions into the converted programs, so if the user is aiming for a combination standard Cobol, he'll have to do a little extra work to remove the extensions. However, he can do this at his leisure since the converted program will run as is.

**Harry T. Hicks** is director of consulting services of Information Management Inc., and is a member of Ani working group X3A-1 (Cobol Standardization). Before joining IMI he held positions with Computer Usage and Boeing.

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## User Can Run His Own Tests

By Richard C. Fredette  
Special to Computerworld

Cobol has attracted users in the last 10 years because of its remarkable facility providing relatively machine-independent programs. Perhaps more than any other single factor, costly second-to-third-generation system conversions highlighted the need for applications software that could be readily exchanged between computer systems.

But if Cobol is intended to be machine-independent, the compilers must have the same features. Happily for the user, the Navy has developed a set of programs that are in effect audit routines to identify compiler shortcomings.

These routines are available to the compiler developer and, even more importantly, to the user for his own in-house testing.

Prior to the recent Cobol explosion, the most widely used programming languages for business data processing were the machine-oriented assembly languages. A primary disadvantage of these languages is that they often required many moves to a single computer system, making it costly for him to change or upgrade his current system.

Techniques of simulation and emulation offered by some vendors permit the programs of one machine to be operated directly on an otherwise incompatible machine. However, programs operating in these machines usually perform at slower speeds than do those programmed for the specific machine.

These methods may be satisfactory for short periods of time, but the loss of efficiency and high cost of operation can eventually become prohibitive.

Another conversion approach, often more satisfactory in the long run, is to recode or translate a user's programs into a language acceptable to the target machine.

The process of recoding and translating, however, is naturally a formidable one—and will be initially expensive and time consuming.

### Greater Potential

By contrast, the Cobol user allegedly enjoys a greater potential for a relatively simple and inexpensive future system conversion. Since Cobol compilers are available for nearly all computers, a Cobol user should experience little difficulty recompiling his programs on another machine and proceeding as before.

Not so, however. Although Cobol has turned machine-independent software into a distinct possibility, that goal is only now on the way to being fully achieved.

One of the factors adversely affecting the portability of Cobol programs is that vendors sometimes implement certain features of the Cobol language in such a manner that one compiler often results inconsistently with another. Another problem arises when vendors selectively omit or include various elements of the language in their compilers.

In either case, there is no assurance that a Cobol program written for one machine can produce identical solutions on another machine.

Much of the blame can be laid to the specifications used for implementing Cobol compilers. In the past, Cobol compilers were implemented from specifications published periodically by the Conference on Data Systems Languages! (Codasyl). The latest specification for new Cobol implementations is the American National Standards Institute (Ansi) Cobol Standard X3.23-1968 prepared after refining and subsetting Codasyl's 1965 specifications.

Although the Ansi document provides a

tighter interpretation for the elements of Cobol, and defines several logical modules for common implementation, it does not in itself limit the development of machine-specific Cobol compilers.

The Ansi Cobol committee realized at the time it started to develop the Cobol standard that it must provide the user with some means of validating a vendor's compliance. Concurrent with the development of the standard, the committee undertook to develop a set of "audit routines" so that each element of the standard Cobol feature could be selected, compiled and executed, giving a "pass" or "fail" indication, as appropriate, for each Cobol feature.

### Only One Interpretation

The routines were to accept only one

interpretation of a Cobol element or statement, meaning that the standard would yield identical results, regardless of the compiler or computer on which it was to be run. The audit routines were also to provide positive identification of the standard Cobol features that were either present or missing in a given compiler.

The committee's intention was to make these routines available to the public independently of the publication of the Cobol standard.

Anticipating an inability to produce audit routines in a reasonable amount of time, both the Navy and Air Force independently initiated projects in 1967 to develop such routines.

The Navy received the help of several

vendors and other users and completed an

initial version of the audit routines in January 1968. Continued vendor and user cooperation had enabled the Navy to make significant improvements to its routines in subsequent years.

Currently, the Navy is consolidating the Air Force and the Navy audit routines into a single set for all DoD. Upon completion of this job, the resultant audit routines will be offered to the Ansi Cobol committee for consideration for adoption by that body.

*Richard Fredette, assistant head of the Navy programming languages section, Information Systems Division, Office of the Chief of Naval Operations, is currently responsible for the implementation of policy and standards for programming languages and other software for programming the Navy.*

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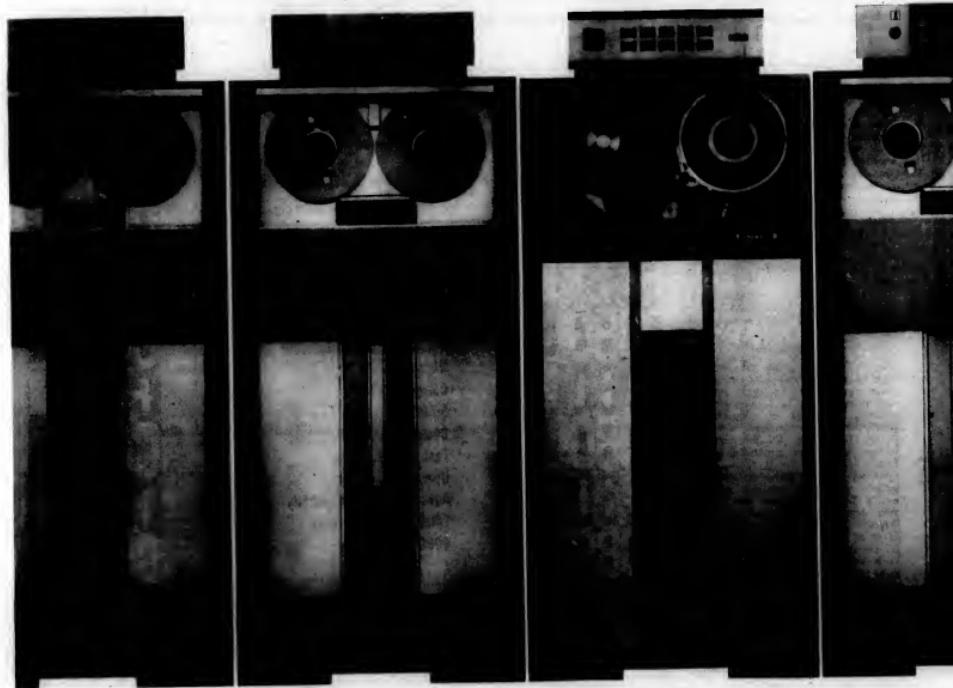
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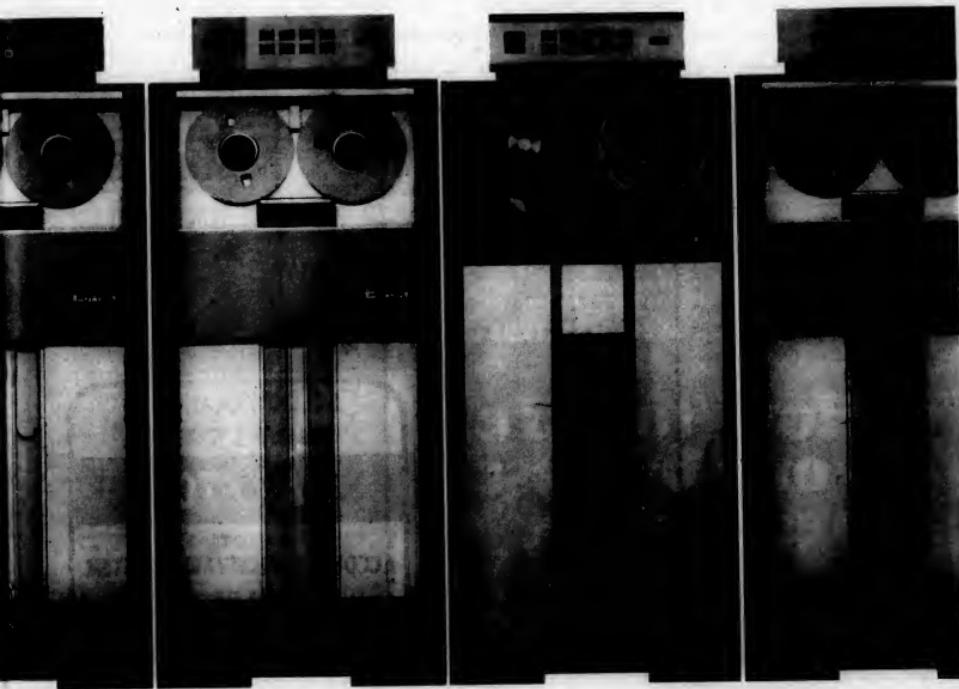


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# Source Generators Build Full Cobol From Shorthand

By Don Leavitt  
CW Staff Writer

Although the English language makes it relatively easy to follow, it also tends to make the coding wordy, repetitive, and burdensome to prepare. Now, however, there are several packages available to relieve the Cobol programmer of much of this effort.

About the only thing the packages have in common is that they produce complete Cobol statements in all divisions of a program from some sort of abbreviated code. Beyond that, they provide a diverse array of features designed toward easing the programmer's work or extending the capabilities of the compilers themselves.

Although they simplify coding effort, source language gen-

erators are not intended for the non-programmer. They do not provide fixed program logic. The programmer develops his own logic for each program, with an understanding of the computer's capabilities.

Most of the source language generators are implemented on, and programmed for, the 360, but several of them can be used on and for other processors.

Atlantic Software said it can provide versions of its "Shorthand Cobol" for the Univac 1106/08, Honeywell 200, Burroughs 3500/5500, and RCA Spectra 70, in addition to the IBM 360. An interactive generator, Cobolext, from the Matrix Corp., can be used for CDC 3000 or GE 600 series, or IBM 360, on the basis of a programmer entry early in the process.

Two generators from Data Technology Inc. (DTI) are deliberately written in and produce a "low level" Cobol so that the packages themselves, and the source language they generate, can be used on a variety of processor.

MicroCobol, developed by Applied Data Research (ADR), is said to produce acceptable source code for IBM's Cobol E, F or ANS compilers. This package allows the programmer to define new verbs for use in his programs, and to create macro instructions that use ADR-supplied macros, in addition to coding many of the Cobol-required words or phrases in shorthand notation.

Rather than language enhancements, Jobol from Computer

Usage Co. (CUC) couples system design capabilities with coding shorthand and system-generated I/O coding to produce source code for the 360. Jobol helps the programmer determine the optimum blocking factor for files, and to appropriate layouts for reports before coding is generated.

The Terminal Oriented Commercial Applications Programming (Tocap) system developed by Tocap International, can make Cobol "conveniently available" to the time-sharing terminal user. It accepts shortened Cobol statements, free-form decision tables, library subroutines and source language debugging statements.

The job decision table module is designed to accept limited, extended or mixed entry tables, covering every possibility expressed.

Debugging capabilities under Tocap include the insertion of trace points and field-examination features.

#### Batch Operation

Another DTI package, Cobility, has features similar to Tocap but operates in a batch mode. Cobility allows shorthand notation for required words or phrases and also lets the programmer use abbreviated data names, which are expanded into

full form at the source language level. Cobility does not include the decision table capability.

The Matrix Cobolext generator also allows abbreviated data names, which are expanded to full form, rather than using mnemonics. The Cobolext programmer uses a uniquely assigned "index number" for each data name referenced in his coding.

Atlantic's "Shorthand-Cobol" offers abbreviations and capabilities that can be used "as is" or modified by the user. It includes a table of abbreviations which the user can also expand dynamically to include words or phrases unique to a given application.

As with several of the other generators, "Shorthand-Cobol" also allows the user to intermix standard Cobol coding with the abbreviated forms permitted by the package.

#### Editor's Note -

The software supplement has been edited by CW Staff Writer Don Leavitt, who has been responsible for the software/services section of the newspaper since 1967.

Leavitt entered data processing in 1962 as a programmer for a major utility. Since then he has worked as a programmer, systems analyst and consultant in banking, manufacturing and service bureau environments.

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## Broker Outlines Checkpoints

# Careful Planning Is Key to Effective Package Use

To help users appreciate the work they should be prepared to put into getting a package, the author outlines four situations with Ted Beam, president of Computer Software Exchange Center, Kansas City. As a software broker, Beam is in a position to understand the problems of both the buyer and the seller.

**Q.** What are the advantages of purchasing software through a broker, or directly from a company that originated the software?

**A.** Even if program alterations are required, most purchased programs can be operational in a fraction of the time that would be required to develop them from scratch.

Plus, the purchase cost generally is less than 25%, and sometimes as little as 5%, of the development cost.

**Q.** What are the disadvantages?

**A.** Assuming that the software is adequately documented and that it can be purchased from a source that has the resources to provide satisfactory technical support, the user is faced with the problem of making any alterations necessary to convert the purchased program to his own uses.

This will sometimes be as simple as changing the I/O formats or changing channel assignments.

On the other hand, it may be necessary to completely reorganize data bases, alter operating systems, purchase additional peripheral devices or create an entirely new subroutine library.

**Q.** It sounds like these problems could be monumental. How can a user avoid having these problems with purchased software?

**A.** This is going to sound very basic, but the one biggest reason for problems is lack of adequate "prepurchase" planning.

**Q.** Why is that such a problem?

**A.** From the advances and heavy production schedules make it virtually impossible for DP managers to make accurate, long-range software plans.

So they are forced to adopt a "let's get something into production" attitude towards software. This tendency, plus the lack of established guidelines, has presented users with significant and unexpected installation problems.

**Q.** Can you tell us more about the type of planning necessary to avoid these problems?

**A.** Two main areas should be considered. The first is — major operational factors related to the in-house hardware, personnel, and time requirements.

And the second area includes all package specifications related to hardware, problem definition, design, program, input, output, and operation.

**Q.** What do you mean by major operational factors?

**A.** All in-house functions and departments affected by the use of the package. A date for the package to be in production must be established, meeting the combined schedules of DP and the requesting department.

Based on this time frame, availability of present personnel to be assigned to the project without impairing standard production schedules must be determined.

If the in-house staff is not sufficient, funds must be allocated for hiring additional personnel. Necessary machine time for the package, including production runs, must be allocated.

**Q.** And what should be examined for the package specifications?

**A.** A complete explanation of each item would take more time than we have today. But briefly, the users should be aware of hardware and operating system

limitations, as well as any logical restrictions or limitations of the application as it is packaged. I/O specifications, including possible sources for required information, must be considered, along with the expected mode and frequency of operation.

**Q.** Once the prepurchase planning has been completed, how would a potential user go about testing the software that fits his requirements?

**A.** If a user decides to search for the software himself, he must be prepared to devote a great deal of time to the search.

Most potential users begin their software search by examining the various listings that are available. Of course, a lot of information may be found in the word and section of industry publications.

**Q.** After a promising software package

has been located, what is the best way for a prospective user to evaluate it?

**A.** As far as I am concerned, the best way is for the purchasing user to run the software package — before purchase — on his own computer under his own operating system. This involves some expense in the development of test data and the creation of test files.

However, it is an extremely effective way to test the documentation and to identify any program limitations. This on-site testing will also give the potential user greater insight into any difficulties that may be encountered in the implementation of the system after purchase.

**D.** Speaking of implementation, we often hear that it costs many times more to implement a system than to purchase it in the first place. Do you find this to be

true generally?

**A.** This condition will exist in two instances. The first occurs when a purchasing user is not able to find a program closely allied with his needs and so he purchases one knowing that extensive modifications will be necessary.

The second instance is where the purchasing user does not adequately define his needs and establish criteria for considering programs. Of course, without a clear picture of what is being sought, it is very difficult to select the most applicable software.

Here again, the secret of limiting or eliminating unexpected modification problems is careful preplanning. This will make it possible for the purchasing user to determine the type and extent of modifications that will be necessary.

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## More Flexible Multiprogramming

# Packages Store DOS Programs in Relocatable Form

By Don Levitt  
CW Staff Writer

While DOS/360 is intended to supervise multiprogramming operations with up to three partitions for separate programs, users have found that IBM's system does not give much flexibility in using the partitions ef-

fectively.

Several independent software houses now supply software support to make DOS more flexible. DOS is economical in its core requirements and generally does not adequately join or coordinating the execution of the programs in the three partitions.

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The rigidity in the system lies in the fixed sizes of the partitions during execution of any job stream, and the inability of the user to easily locate his program in any of the partitions he wishes.

Normally under DOS, a program is cataloged to a particular partition, and can't be run in either of the others without special effort.

#### Relocatability Problems

Until the most recent releases of DOS, relocatability of programs using tape files was particularly difficult, and effectively impossible, since tape units used by one partition were unavailable to the others.

DOS relocatability could be achieved either through special programming techniques in Assembly Language programs or by cataloging the program into each of the partitions in which it might run.

The first approach, using Reloc macro and other coding, is, as already noted, available only for BAL programs and has been incorporated in the language processors for the higher lan-

guages, nor in the linkage editor.

The second method of achieving relocatability requires separate link-edits for each partition in which the program is to be run. In turn, these link-edits result in separate copies of the program being cataloged into the core-image library, and separate program names and job streams being needed to initiate program execution.

With separate link edits, the user runs the risk of failing to use all copies of the program when maintenance is required. Large amounts of disk storage space are required to hold these images in the library.

#### Independent Packages

Three independently developed software packages said to make DOS/360 application programs completely self-relocatable are:

- **Dosrelo**, available from Bootle Resources,
- **Relocate**, from Vender, and
- **Selfrelo**, from Webster Computer Corp.

With any of these packages, only one copy of each application program is stored on the computer's memory addressable formats carried in that copy are not limited to a single partition, but allow the program to be run in any of the partitions without further modification.

Although each of these packages accomplishes the same basic goal (and not about the same), each attacks the problem somewhat differently.

**Dosrelo** and **Relocate** are effectively free-standing programs that work closely with, but are not modifications of, the DOS supervisor or linkage editor code.

**Selfrelo** does add coding to the supervisor and produces self-relocatable programs automatically rather than through a separate step in the compilation/link-edit process.

**Booth's Dosrelo** requires 24K of 26K core and a separate set of JCL statements per program. The program is run between the assembly/comparison step and link-editing. Dosrelo reads the object code generated by any of the standard language processors, and produces an additional card set which is combined with the original card link-edit file.

**Vender's Relocate** makes two requirements of each link-edit: the modification of the phase card to the self-relocating form, and the addition of one card to initiate the Relocate operation immediately prior to executing the linkage editor. Because of partition sizes, and hence beginning addresses, does not require re-link-editing.

**Webster's Selfrelo** provides complete relocability for Cobol, Assembler, Fortran, PL/I and RPG object programs, as do the other packages.

Relocation is automatically accomplished through a control card option during "Catal" function.

Each of the packages appears to successfully support relocation, overlays, phases with Common reference, root phases and multitasking.

Situations in which overlays and overlays can, however, cause problems and take some serious programming effort, with any of the packages.

While the Webster approach of adding coding directly to the DOS supervisor may make that package more efficient than the others, it also cause some confusion in the event of program problems.

In order to distinguish between problems caused by IBM-supplied coding and Webster-supplied coding, the user would be well advised to maintain copies of the supervisor, both with and without the Selfrelo logic.

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# Contracts, Services, Packages Aid Transferability

By Don Levitt  
CW Staff Writer

In spite of the soothing tones of manufacturers' announcements calling for "universal compatibility," the transferability of applications and programs from one system to another and language conversions are still serious problems for many users.

Users who move from one manufacturer's hardware to another's must be aware of what they face in terms of necessary conversion or rewriting.

Even users who stay with a manufacturer may face problems. For example, moving to the 370 from the 360, a user can stay with the program that runs on the 360, including old 1401 programs under emulation. But to get the most efficiency from the system, and to protect himself in case program maintenance is required, the user probably should convert the Autocoder programs.

#### Conversion Problems

Even without changing equipment, the user may face conversion problems brought on by the manufacturer's decision to drop support for a particular language processor. The users of IBM's Cobol F have this problem now.

Transferability can also be a problem to the user who finds a program or entire

application that is "exactly" what he needs, but implemented on an incompatible processor.

If there are problems, there are also solutions. RCA's guaranteed software conversion contract should take the pressure off any 360 user moving to the new RCA systems.

The user who wants to upgrade his processor from second generation can call upon various "translation" services, or he can use any of several conversion packages on his own in-house equipment.

The services themselves generally use computer programs to perform the conversions, and claim anywhere from 70%

to 90% effective transformation with the mechanical approach alone.

The transformation effectiveness in-house or by service is adversely affected by instruction sequences that are perfectly acceptable to the old language, but which cannot be "understood" by the

(Continued on Page S/14)

# Buying Packaged Data Management Seems Best

By Peter L. Briggs  
Software Analyst

One particular type of packaged software, information storage and retrieval systems, is still attracting interest from many different users. There are several problems in using such systems and in obtaining them from outside sources, but these problems are minor compared to the problems of in-house development, for the majority of potential users.

To develop a data management system of any complexity, the user must hire a small staff of specialists.

A group of four is about minimum and these four specialists are probably worth about \$18,000 each on an annual basis. Taking overhead into account, the group will probably cost the company about \$25,000 per year in salaries, benefits, space, management time, etc.

A typical information storage and re-

trieval system requires about two years to develop and to install.

Two software firms that have been through the process found that in one case it required about 500 hours and in the other, about 800 hours of machine time for development and debugging.

In both cases the work was done on a fully multiprogrammed 360/65 system at approximately \$300,000/mo, thus costing the company about \$5,000/mo for the development work.

If the average of 650-hour total were divided into eight-hour shifts, it would amount to nearly four calendar months at \$5,000/mo or \$20,000 for the project.

#### Overall Cost

If these figures are reasonable, and both the software companies interviewed admit that they seem so, then the average general-purpose information storage and

retrieval system costs at least \$270,000 to develop and install.

The most obvious alternative approach, for the IBM user, would be to lease the basic software, probably Version 1 of Information Management System/360 at \$500/mo, from IBM and hire a systems analyst to alter the system to fit the user's requirements. One user who followed this route told CW that it took about a year to handle the alterations; this would make personnel costs about \$33,000.

Maching time for the alterations ran to about 200 hours and cost the user about \$9,000 on a 360/65. Total fixed costs, including the software, was useful, then ran about \$49,000, including the one-year lease cost of the software.

The other principal alternative would be to purchase, or lease, the software from

(Continued on Page S/12)

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April 26	Independent Peripherals, Part III. Output: COM, Printers Supplement	
May 12	SICC SHOW ISSUE	
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**COMPUTERWORLD**  
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## Mini Users Benefit Most

# Cross-Assemblers Promise Speed, More Features

By Don Levitt  
CW Staff Writer

Minicomputer users have a rash of available cross-machine assembler packages that use varying combinations of host-and-target machine and cross-machine. Most of these packages allow programs, designed for a minicomputer, to be assembled, and often debugged, on a larger general-purpose mainframe.

At least two cross-machine assemblers provide even more flexibility than the others. In theory, Computer Bi-Sys allows the user to assemble programs for any machine (mini or full scale) on any machine that supports ANS Fortran. Interfaces have to be developed for each new target or object machine to be served by Bi-Sys. Proprietary Software's Dual package provides double flexibility. With Dual's

meta-compiler capabilities, the user can define his own language and then modify it dynamically, if he wishes, during the assembly of a program. In addition, the assembly of a program on one machine, Dual may include various modular "object converters," which generate object code for particular machines. A user, then, can write a program in his own language and have it run on any machine or machines of his choice.

These are perhaps typical of the mini-assembler packages.

- Novac and Nomac, from CompTek Research, Buffalo, N.Y., provide for the assembly and operation of Nova/Super nova programs on a 36 or on a DEC PDP-10.

- AT-16, from Automated Technology, provides assembly of Honeywell C/C 16-bit machine programs on a 360.

- Interactive Minicomputer Programming (IMP) service, from Applied Data Research, assembles Nova programs on a PDP-10 in a time-sharing mode.

- Programs from the DEC users group are geared to having PDP-11 programs on PDP-10.

Users can consider the assembling and testing of minicomputer programs on larger machines because of several reasons, according to the developers.

The mainframes generally have better and faster I/O capabilities than the minis, and with larger memories available, the assemblers can be more efficient than they would be on the restricted mini memory.

Again, because of the larger memories, the cross-machine assemblers can often provide macro and other capabilities that

simply could not be included on the minis.

Finally, the developers note, going to another machine for program development work leaves the mini free for full-time production.

### I/O Capabilities

The biggest advantage of any of the cross-assemblers would seem to lie in the better I/O capabilities available on the mainframes.

While many of the minis have restricted input language processors, the assembly process takes vast amounts of time when geared to the typical paper tape or keyboard input and paper tape or teletypewriter output. The ability to input at card reader speed and output at card punch and line printer speed would obviously increase productivity.

In some cases, the user might even go one step further and put his input on magnetic tape to get more speed.

Although the assemblers generally available from the mini manufacturers include many of the conventional step-by-step operations of data movement, arithmetic, and logical decision making, there are few, if any, higher-level language elements.

Processing of macro instructions, in which a number of lines of object code are generated from a single line of source code, requires more storage capacity for the processor than is available on most minis.

The cross-assemblers, with access to the larger mainframes, often include just such features as macro instructions.

Paradoxically, a cross-machine assembler that has macro capabilities puts a very specific constraint on the user even while providing higher-level language freedom.

The user must have access to the proper host machine as often as he needs to perform maintenance on the application program using the macros. The original assembler on the object machine cannot expand the macro into the string of instructions as the cross-assembler can.

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## Buying Package May Be Best Method For DMS Installation

(Continued from Page S11)

an outside software firm. Such packages can be purchased at prices ranging from about \$17,000 to nearly \$100,000, each with different features and different machine requirements. It would be likely that the user would have to pay about \$20,000 to \$25,000 for a package similar to the one supplied by IBM. Should the user choose to lease the package, he would be paying between \$1,000 and \$2,500/mo., depending on the terms of the lease.

Where the user develops his own system, he must plan on spending at least \$270,000 and waiting two years for the system.

For the next-best plan, where IBM supplies the package, the user can expect to spend \$49,200 and wait one year for operation.

In the case of the IBM software, there is an additional ongoing expense of \$7,200/yr. for leasing the software, once the system is operational.

For the best plan assuming moderate prices, where the software and alterations are supplied by an independent software firm, the user also has to wait about \$50,000 for the system to become operational, reduced to about six months.

Peter Briggs is an independent consultant specializing in data processing.

# Packages Can Report Effectiveness of User Programs

By Don Leavitt  
CW Staff Writer

Users ought to be more concerned with the effectiveness of their programs. The language assembly systems they are using force them to consider the validity of their coding. Attempted executions, assuming there are data, highlight any flaws in the program logic.

But many installations use nothing more than manual desk-checking to sharpen the operation of the programs, even though there are software packages available that could help in this effort.

Several software packages include computer component usage accounting as part of their operating systems. From IBM's OS/360 or Univac's Exec 8, for

example, a user can determine how much of total execution time is spent in the wait state, in processing, disk accesses or tape reading.

But these are gross statistics and do not show what specific parts of a given program are taking disproportionate amounts of time.

## Alternatives

What alternatives does a user have? Theoretically, he could be able to develop his own program to monitor the operation of other programs, but realistically this approach is open only to the most skilled staffs.

It requires accessing, recording, and reporting system data that is not normally used or even available to the user. The monitoring-reporting functions have to be so well designed that they add an absolute minimum of overhead to the systems load.

OS/360 users apparently are the only ones who can now get packages support

from independent vendors or mainframe manufacturers, although similar evaluation packages are said to be presently under development at other sites.

Programmer Efficiency (PPE) Program and Lambda Efficiency Analysis Program (Leap) are available respectively from Boole & Babbage and from Lambda Corp.

A more modest package, called Progbook, is also available — from the Cosmic software clearinghouse at the University of Georgia.

The packages are similar in that they report the results of periodic monitoring of various system signals in the form of histograms and supplementary printouts. These are produced by a data reduction program run after the completion of the job stream being monitored.

## Divergent Approaches

Despite their overall similarity, the packages clearly show divergent approaches as to how software measure-

ment data should be made and/or reported.

PPE and Progbook each give the user the option of defining the frequency of the sampling. Leap, on the other hand, sets its own frequency dynamically, increasing the sampling when the program is spending a great deal of time in a given area of core, and cutting back in the less heavily used portions.

The result, according to Lambda, is that the user automatically gets a sharper focus on the parts of the program that are time-consuming.

All three packages can operate under OS/MVT, but that is the limit of the Progbook capabilities. Leap can also function under MVS environments, while PPE can be adapted to any of the OS options, according to Boole & Babbage.

Leap costs \$8,500 and PPE \$8,800. The Progbook package, developed at Stanford Linear Acceleration Center, is available from Cosmic for \$275, with documentation an additional \$3.50.

## Monitors Gauge CPU Utilization

It was once said that a good programmer didn't have to know what was actually happening inside the CPU, any more than a good driver necessarily had to know what was happening inside the carburetor.

Now, as systems become more sophisticated and more complex, and independently of each other, in multiprogramming mode, for example, the user has to be aware of the interplay of the elements. Various measurement aids are available to help the user in his understanding of how effectively his system is functioning.

Hardware monitors are quite literally "use-it-once" including needles or probes that can be attached to various parts of the computer. The probes measure the presence or absence of electronic signals and the resulting information is recorded, often on magnetic tape.

Later it is organized, reduced, and analyzed by a specially designed software program that produces printed reports.

Most of the hardware monitors are geared to measuring such elements as central processor utilization, the execution activity of all channels, and devices during program runs. Reports showing head-to-head comparisons between disk cylinders could help the user optimize his volume organization, thus clearing throughput bottlenecks.

## Monitor Variation

Still another variation on the hardware monitor is a software package that measures the varying speed of various peripheral devices, compares the measured speeds to manufacturers' specifications, and reports the devices' variations from the norms.

While this is basically intended to help the user maintain his equipment at optimum operating effectiveness, it could be used to compare peripherals from competing manufacturers. An independent vendor's disk drive that is said to be plug-to-plug compatible with IBM's 2314 could be tested on site so that the user would know which unit actually performed better.

Other monitors are, in effect, "pseudo-hardware" monitors. These are software programs that allow the user to simulate proposed hardware changes, and determine what effect they might have on his operations.

The effectiveness of the simulators clearly depends on the accuracy of the proposed or peripheral "model" being used. Although some of the vendors offer a complete library of "models," the user familiar with simulation techniques could build his own library with any of the general-purpose simulation languages available. If the user isn't knowledgeable in simulation techniques, it seems likely that even the packages geared to handle were simulation wouldn't do him much good.

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# Multiprocessing Monitors 'Multithread' Messages

By Don Leavitt  
CW Staff Writer

Users who want to improve the efficiency of on-line applications operating in a multithreading environment can do so with the monitor systems/access method packages from various vendors.

At least one of these packages, Task/Master, can be implemented on "any" operating system, according to the developer, Turnkey Systems Inc. Some of the other systems, however, are intended for use only on the 360 under DOS or OS.

#### Core Utilization

The Environ/I operating system appears very efficient in terms of core utilization. The system allows most 360 real-time applications to be run in a CPU and core configuration one size smaller than would be needed otherwise.

For example, the developer, Information Storage Systems, said that an installation that presently requires a 512K

360/50 can produce the same job throughput on a 256K 360/40, using Environ/I.

In addition to saving core, Environ/I also outstrips conventional single-thread and multithread message-handling systems in response time, the company said, and the improvement increases as the system grows in complexity.

The current version of Environ/I has been implemented under DOS/360 and is said to support up to 30 terminals, with an average rate of one transaction/sec, on a 32K 360.

#### ISS Package

The ISS package apparently gains much of its effectiveness from a proprietary Compressed Indexed Sequential Access Method (Cism) that is an integral part of the package. With tighter record formatting, Cism moves data faster than IBM's ISAM permits.

A two-part access method/on-line moni-

tor system that also claims significant core savings and faster message processing through multithreading is the Amigos/Hyper-Faster system from Comres.

The Amigos portion of the package is said to be 180 times faster than it is intended to replace IBM's ISAM.

The Hyper-Faster portion of the Comres system is intended to enhance the Faster monitor system available from IBM. The Comres modifications to the IBM coding may permit the processing of 10 transactions concurrently, compared to one transaction processing under the original Faster logic.

As an option for the Hyper-Faster user, Comres said that it can support IBM 2260 local terminals under OS/360.

Undoubtedly the most spectacular monitor system available from a non-hardware manufacturer is the National CSS package for a 360/67, in single and dualplex mode. Developed for use on the National CSS time-sharing network,

VP/CSS has been packaged by the company for user's in-house installations. Another monitor system based on the Faster package, Multi-Faster, from System Dynamics Inc., replaces the IBM coding, rather than supplementing it.

Multi-Faster utilizes re-entrant forms of the Faster subroutines to reduce core requirements while still supporting multiple users concurrently.

Three major features distinguish Multi-Faster from the earlier Faster: separate tasking of line and network control; priority message scheduling; and the multi-threading of message processing.

#### Automatic Rerouting

Although each application and each terminal has an individually assigned priority level, Multi-Faster provides quick automatic rerouting to higher priority of any low-valued messages that are otherwise being bypassed.

Multi-Faster is available in versions for DOS, OS/MVT, and OS/MFT/II operations. IBM's Basic Telecommunications Access Method (BTam) is used to support the terminals and the lines are accessed via discrete QLLP control.

Use of the Internetwork monitor system from Programming Methods Inc. seemed particularly impressed with the system's data collection and dispatcher capabilities that control the handling of messages and the loading/unloading of the application programs as required.

Turnkey Systems' Task/Master provides terminal communications support including terminal initialization, message switching, assignment of priority of response by application, error recovery and overlay control.

Task/Master differs from the other monitor systems in that it is not limited to IBM equipment and can function under any operating system, the company said, as long as it provides standard compiler and linkage support, and has one or more direct access devices.

The Task/Master monitor system also differs from some of the other systems in that it supports both batch and conversational modes of operation.

## Some Solutions Exist For Transferability

(Continued from Page S/11)

#### Translation package

The cost of service or package to convert COBOL 1401 programs probably has to be based on the number of programs to be converted. The services generally charge on a "per card" basis, sometimes coupled with a "per program" charge as well.

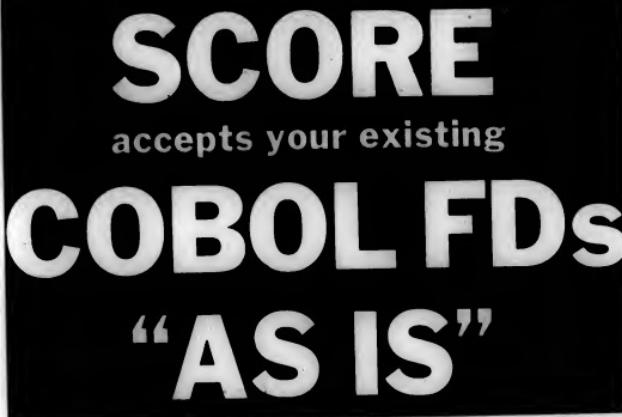
IBM told its Cobol F users that support for that compiler would be dropped two years after the introduction of the ANS Cobol. To stay in Cobol, users have to convert the newer compiler.

In this case, however, IBM is providing, without cost, language conversion programs that will take the bulk of the conversion shore from the user.

Transferability between incompatible systems will become easy if the concept behind the Polypac cross-language processor can be fully developed. Basically, Polypac will be able to accept as input a source program in any language and transform it into another program in any other language, at the user's option.

Unfortunately for the average user the only input module that is available is for one language, though output modules have been developed for ANS Cobol, RCA Spectra 70 Cobol and an assembler language for a minicomputer.

The choice of Adpac as the initial input module is natural enough since the developer of Polypac is Adpac Computing Languages Inc.



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## Texas Studying TB Control System

AUSTIN, Texas — As part of a pilot study designed to determine the feasibility of a statewide tuberculosis control system, a computer initially is handling incoming and outgoing information from the State Tuberculosis Hospital in San Antonio, almost 100 miles away.

"Our goal is to develop a complete TB management information system covering everything from patient entry to return to laboratory reporting," said State Health Commissioner Dr. J.E. Peavy.

Through a remote communications terminal at the hospital, patient billing data will be transmitted to a Spectra 70/45 for daily data update, permitting the hospital to receive computer-stored billing records most instantaneously.

If the pilot study proves encouraging, two other state tuberculosis hospitals will be brought into the network that eventually would link 12 regional centers to

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**COMPUTERWORLD**  
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

# Computer Industry

a Computerworld news section about the nation's fastest growing industry

January 27, 1971

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## CI Notes

### Hypertech Likes Terminals

**HARWOOD HEIGHTS,** Ill. — Hypertech Corp. is finding happiness in the Viatron-like terminal market. One of the firms to enter the key-to-cassette data entry field after it was pioneered by Viatron, it is now reporting orders.

Hypertech is marketing terminals at Inland Steel and American National Bank and has entered the overseas market through Case in Great Britain and Syncite in the Commonwealth market. Agreement with a Japanese firm is expected soon.

#### ...And Moves vs. Viatron

Hypertech may also be moving against Viatron's stronghold — New England Bell Telephone. The AT&T unit is reportedly pleased with an evaluation of Hypertech's GTU-1. Sources say it will not buy the units unless Viatron goes "down the tube," since New England Bell is already committed there.

#### Calcomp Plotters 370-Compatible

**ANAHEIM,** Calif. — It's not surprising that IBM system design and development division has demonstrated the compatibility of Calcomp plotting systems with IBM's new 370/155. IBM sells the Calcomp plotters on an OEM basis.

#### Raytheon Still in Display Race

**WASHINGTON, D.C.** — The Federal Aviation Administration has awarded a contract for up to \$463,438 to the equipment division of Raytheon for the installation and checkout of a computer display channel and associated radar displays for FAA's National Aviation Facilities Experimental Center.

#### Ferroxcube Forms New Unit

**SAUGERTIES,** N.Y. — The formation of a new memory products division has been announced by Ferroxcube Corp. The systems division, formerly in Denver, Colo., and the computer components division have been combined.

#### Supershorts

RCA has won a contract to provide the U.S. Army, Pacific, with seven Spectra 70 computer systems having a sales value of \$11.7 million. The contract also includes an option for an additional 14 Spectra computers, which could raise the equipment value to \$30 million.

Codex Corp. has delivered high-speed data communications terminals to Air France. The units combine multiple high-speed reservations traffic paths between Paris and several North American cities into a 9,600 bps serial transmission through single transmultiplex cable voice channel.

A research project aimed at helping American companies improve their pricing policies and strategies for marketing computer products in Europe is being prepared by International Data Corp., Newton, Mass.

### Exhibitors Few But 'Serious'

## Designer Show Brightens OEM Market

By Phyllis Huggins

CW West Coast Bureau

**ANAHEIM,** Calif. — A highly respectable entry into the field of computer conferences made its debut here last week, with an estimated attendance of 5,000.

The Computer Designer's Conference and Exhibition pinpointed its interest directly at the OEM market and exhibitors and attendees gave it a vote of confidence.

Louis Feldner, On-Line Computer Corp., Stamford, Conn., said: "The conference reflects the economic climate. There aren't many kids here. We're all tough, seasoned people and we're serious about our business. The people coming into the booths are also serious. It's a good show."

He lauded the conference management for the professional quality of its planning and the support it gave the exhibitors.

Milton Kiven, conference chairman, said that there were surprisingly few cancellations by exhibitors although it was just over a month ago that exhibitors, management was pleased with it and planned two such conferences a year starting in 1972. The western one will be held in Anaheim and the eastern one in Boston. A European conference will be scheduled in the future.

Largest draw of the technical sessions was the "Minicomputer Architecture and Design," chaired by Don Pritchard, Data Systems Engineering Inc., Santa Ana, Calif. Popularity of this session was credited to the fact that in the general Anaheim area there are more minicomputer companies than in the rest of the country.

The technical seminars covered the subjects of implementation of multiprocessors, aerospace computer requirements and developments, chaired by Gwen Hayes, Wetherspoon Electric Corp., and semiconductor memory, chaired by Stephen A. Thompson, the *Electronic Engineer Magazine*.

Proceedings cost \$19.50 and may be obtained from Industrial & Scientific Conference Management, Inc., 222 West Adams St., Chicago, IL 60606.

A cross-section of the exhibits showed the scope of the show. Displays included a line of advanced memory systems including alterable U-core ROMs and bipolar RAM and ROM systems.

USM Corp.'s Electronic Control Group displayed a variety of actuation elements, motors and sensors, designed to serve as key components in motion control and positioning systems for computer peripherals.

A new line of one-piece, all-nylon cables was introduced by Panduit Corp. Superior Electric Co. showed its new Si-Syn photoelectric tape readers which combine photoelectric design with direct stepper-motor sprocket drives.

The electronic tube division of GTE Sylvania had defined its booth at CRT display and special products that demonstrated a variety of cathode ray and special-purpose tubes for computer ter-

minal and readout display equipment.

At the conference, Bert Forbes of Hewlett-Packard called for a better definition of compatibility to help companies communicate between the computer designer and the computer user.

Forbes said that fuzzy causes of architecture were now causing a serious lack of communication and stated that architecture should be redefined to include the whole computer system.

#### Whole System

Under his definition, the whole system would include not just the central processor and not just the hardware, but hardware, software and whatever other devices are connected to the system in a particular way.

In control computers, Forbes said that hardware specifications such as cycle time, DMA transfer rates, and interrupt response times are the most important, because the computer is essentially a component. As systems become more complex, these become less of a factor, he said.

"Each individual specification cannot be set up," he said, "and examined alone as though it were the deciding factor in designing or purchasing a real-time system, but must be taken as part of the whole."

One hopes that both designer and users

will go beyond the traditional and personal evaluation of a potential system, joining me in a plea for sanity in those who conceive the system, those who write the programs, those who read the specs and those who analyze the specs in terms of the requirements of the overall system."

In addition, an experimental computer-aided logic packaging and partitioning technique developed to provide computer designers a tool for partitioning of logic functions and for logic placement was outlined by R.J. Giannuzzi, C.S. Gorski and J.H. Stevens of the IBM systems development division laboratory in Endicott, N.Y.

The criteria used in attempting to optimize this process are found to vary with the system, technology, and designer's style. According to Giannuzzi, "The lack of a standard used for logic placement for optimizing partitioning has retarded success in development of a universal automated partitioning system."

The major components of the new system are a readily accessible file to store a block graph description of the logic function, a logic editor for defining the assembly of logic blocks into partitions, automatic testing of partitions generated against designer specified constraints, display facilities to provide feedback, and a means of storing and retrieving partition results as well as hard-copy printout.

## Bombay Welcomes New 1401s

By D.L. Ernst

CW Bombay Correspondent

**BOMBAY,** India — Warmly brand new 1401 and 1410 computers from IBM instead of the used versions being peddled in the U.S. Taka hope, they do exist.

This formerly sleepy outpost of the British Empire has been turned into the worldwide center for the manufacture of the IBM 1401 and 1410 CPUs.

This is presently the only place in the world where the system is manufactured. The key role of the Bombay operation is highlighted by the fact that a spokesman for the IBM data processing division in White Plains, N.Y., told CW that the last new 1401 was built in July of 1965.

But the worldwide leader in computers is not resting on its laurels,

however, and has applied to the Indian Government for permission to begin manufacture of System 360s here.

According to a spokesman for IBM, quoted by the *Bombay Financial Express*, the 360 is the firm's latest computer system and computers in the series [are] on order in the U.S. and elsewhere in the world.

The *Financial Express* points out that the "latest technology used in this computer enables it to type, tape, print, punch, draw, photograph, or answer a telephone for solution of a number of problems."

According to industry sources interviewed by this correspondent, the less developed countries don't want older equipment, but want the most recent technology available.

With its 1401 plant here IBM is certainly giving it to them.

## RCA Realigns Its IS Operations

**CHERRY HILL,** N.J. — RCA has realigned its information systems operations and industry sources expect the firm to announce shortly a major push into the overseas marketplace.

The realignment comes shortly after the elevation of former IBMer, L.E. Donegan Jr., to the position of vice-president and general manager for computer systems.

The split-off of a foreign push for the firm comes at a time when RCA operations are relatively weak overseas while other computer manufacturers are grabbing a large share of the overseas revenues.

At the same time, overseas operations for some of the other manufacturers are increasingly contributing to their profits.

The domestic realignment entails the

administrative and planning functions of the firm's information systems group and the formation of two divisions, a staff group and a manufacturing operation.

The newly structured organization will be called RCA Computer Systems and will consist of five operating divisions — data processing, systems development, graphic systems, memory products, and magnetic products. In addition, it will have a computer systems staff group and a systems manufacturing operations organization.

New management assignments in the Computer Systems organization include: Joseph W. Rooney, president of the data processing division; V. Orville Wright, president of the systems development division; and John R. Lenox, vice-president, systems manufacturing operations.

#### Correction

On page 45 of the Jan. 13 issue CW reported that the cost of the flux ring memory array from Signal Galaxies was 7 cent/bit. It should have read 0.7 cent/bit.

## POSITION ANNOUNCEMENTS POSITION ANNOUNCEMENTS

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A vacancy exists for a senior systems programmer to take charge of a team of persons responsible for maintaining and optimising the performance of the operating system (IBM O.S. MVT Release 19). Previous experience of the IBM O.S. operating system is essential and experience in supervising staff would be a recommendation.

The commencing salary will be by negotiation and will depend on previous experience. Applications in writing, giving full details of particulars and details of qualifications and experience should be lodged with the Registrar, University of the Witwatersrand, Jan Smuts Avenue, Johannesburg, by not later than 15th February 1971.

# COMPUTERWORLD

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# Orders and Installations

Amplex Corp. has delivered a Model 3DM-2000 core memory system to the Indian Hill Laboratory of Bell Laboratories, Naperville, Ill.

The Electricity Supply Commission of South Africa, with headquarters in Johannesburg, has ordered a Control Data 6400 computer system, valued at \$3 million.

The Colorado Division of Employment Security installed a Burroughs B 3500 computer system valued at \$470,000.

The Danish Postgiro has ordered a second large-scale OCR system and leased an input image microfilm system from Recognition Equipment International, Swedish subsidiary of Recognition Equipment Inc. The system is valued at \$751,000.

American Bank and Trust Co., Baton Rouge, La., has ordered a Burroughs B 3500 computer system valued at more than \$57,000.

The Fairview Hospitals of Minneapolis have ordered a Univac 9400.

European Organization for Nuclear Research (Cern) of Geneva, Switzerland, has ordered a Control Data CDC 7600, valued at \$9 million.

Cooper del Conti, the control and accounts agency within the Italian government, has ordered an OCR system from Recognition Equipment Italia, S.p.A., a subsidiary of Recognition Equipment Inc.

The University of Notre Dame has installed an IBM 360/50 valued at \$1.4 million to increase its research and teaching capability.

NCR Century 200 computer systems have been ordered by Yancy and others, Co., Atlanta, Ga., and Data Technical Analysis, Honolulu, Hawaii.

Silja Line, Turku, Finland, has ordered two Univac 9400 computer systems, valued at \$1.2 million, from the Univac Division of Oy Sperry Rand AB Finland.

Honeywell Information Systems has announced the following orders and installations of computer systems by local government: a Model 115 for Crowley, Eng., a Model 110 by the City of Pasadena, Texas; and a Model 120 by the City of Buena Ventura, Calif.

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## Seller's Viewpoint

# Experienced Intermediary Aid Needed in Merger Talks

This second of two articles on "do's and don'ts" by merger-minded companies by W.T. Grimm, president of W.T. Grimm & Co., a merger specialist, covers a potential merger from the viewpoint of the seller. From the seller's viewpoint, there are several considerations

for the merger-minded company.

Don't think every buyer is a bargain hunter—though many are. Maybe he needs you more than you need him.

Do be prepared to furnish a complete, concise account of the status, prospects and problems

of the business. At the proper time, take the buyer into your confidence and give him access to historical financial records as well as most recent statements.

Do consider what the buyer does not say—or well as what he does say.

In a merger, as distinct from a

cash sale, do recognize that you must evaluate the buyer as closely as he looks over the seller.

Cash sales are taxable. Mergers, properly set up, are tax free.

You will find that you don't know all the answers. Try to structure the deal yourself may lead to costly mistakes. At the proper time you will need expert legal and accounting counsel.

Do make a rational self-appraisal of your sincerity in trying for a merger.

Don't overprice your company. If you stay on, you have to live with a new owner to assure that he gets a realistic return on his investment.

Pricing a business and evaluating mergers are impossible.

Two companies in the same industry with equal earnings cannot be judged by hard and fast formulas. One company may have a heavy debt structure and its earnings may be largely the result of such leverage.

Not only is the average of price/earnings ratio for an industry suffice, because profit

margins vary from company to company. Moreover, what may be a minor factor for one seller can be a critical factor for another.

Too much concern is shown over the determination of price. Corporations are not static; audits are not investment appraisals; product-mixes change; management capacity for innovations may change, and so may labor relationships as well as competitive conditions. Mergers projects get into the "meeting of minds" stage and then drop flat. Very often the reasons relate either to technical matters involved in the tax treatment of the merger or to management control. Sometimes the market price of the buyer's stock becomes the pivotal factor. Again and again such frustrations upset promising mergers.

All these factors point to the need for experienced intermediary assistance to keep negotiations on the track and achieve the proper objectives of both buyer and seller.

## Amplex Test Tape Evaluates Performance Of Longitudinal-Head Magnetic Recorders

**REDWOOD CITY, Calif.** — A precision test tape which evaluates the performance of longitudinal-head magnetic tape recorders will be marketed by Amplex Corp. under a domestic and international marketing agreement between Amplex and R.L. Electronics Communications Co. Inc. (RLC).

The tape is designed to measure tape speed and tension, head stack displacement error, jitter, time base error, drift and tape slippage, and contains uniformly spaced pulses which provide a standard method to calibrate tape recording and playback systems.

The manufacturing process employs the patented "sing-around method" in which recording of each signal by a head is triggered when a fixed position reproduce head scans the previously recorded pulse.

The RLC test tape is available in 1 in. or 1/2 in. wide formats on any thickness, length and quality of tape desired. The prices range from \$100 to \$1,300 per tape with 20 day delivery.

### Electronic Memories Heralds Megamemory 1000

**HAWTHORNE, Calif.** — Electronic Memories' Megamemory 1000, a 2-wire 2-1/2D core memory system, has an access time of 350 nsec with a 1.5 usec

cycle time. Storage capacities range from 32,768 words of from 32 to 160 bits/word up to 524,288 words of from 8 to 14 bits/word. The Megamemory 1000 can be rack-mounted in a 19-in. or 24-in. EIA chassis or custom

and +2.55 Vdc minimum 0.12 mA maximum for logic "1".

Micro Switch, a division of Honeywell Inc., is at 11 W. Spring St.

### Other New Products

Computer Microtechnology Inc. is producing two new bipolar 1K-bit read-only memory chips. CM 2800 is organized 128 by 8 bits/words, and the CM 2850 is a 256 by 4 ROM.

Each features access speed of 50 nsec, with power of .4 mW/bit. The units are TTL and DTL compatible.

Prices in quantities of 25 are \$57 for the CM 2800 and \$50 for the CM 2850, from 611 Vaqueros, Santa Clara, Calif.

A 256 by 1 MOS RAM which interfaces with TTL or DTL without pull-up or pull-down resistors has been developed by Unisem Corp., a subsidiary of United Aircraft Corp.

The 256 by 1 is TTL-compatible, the new RAM offers a parallel memory with below 1 msec access time that draws power at 1 mW/bit.

Unisem Corp. can be reached at P.O. Box 11569, Philadelphia, Pa.

### New OEM Products

housed.

Electronic Memories is at 12612 Chadrac Ave.

### Micro Switch Keyboard Features 'N' Key Rollover

**FREEPOR, Ill.** — A keyboard combining MOS technology and the "N" key rollover feature designed by Micro Switch. The manufacturer said the 128-character, Hall-effect keyboard, designated the 61SW12-1, is available from stock.

The 61SW12-1 is encoded with the 7-bit Usascii code plus odd parity.

Power requirements for the 61SW12-1 are +5 Vdc and -12 Vdc. Data key outputs (positive logic) are +0.6 Vdc maximum 1.6 mA maximum for logic "0."

The current "Gray Sheet"

-- a Midyear Review -- examines the status of each major mainframe supplier and all industry segments. Send for the current issue -- \$8.

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How do things look for the computer industry as the pause in growth apparently is ending?

The current "Gray Sheet" -- a Midyear Review -- examines the status of each major mainframe supplier and all industry segments. Send for the current issue -- \$8. Or, go ahead. A year's supply only costs \$75.

### EDP industry report

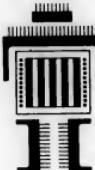
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This portable terminal has a two character buffer that prevents it from falling behind when receiving data from a computer--puts an end to keyboard lockup and loss of information. There's nothing else like it, the Novar 5-41.

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**Our March 31st  
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- Which user sites can make best use of bulk memories?
- Can independent suppliers continue to provide savings to computer users?
- Trend to disks.
- What can independents offer besides lower prices?

*Our Independent Peripherals Memories Supplement* closes March 12. Reserve your advertising space by filling out the coupon below, or contact your local Computerworld representative.

**Our April 28th  
Outputs Supplement**

- Will feature:
  - Which users can make best use of COM (computer output microfilm)?
  - Can plotters have any applications to business?
  - Printers - Impact vs. non-impact, speed vs. copies.
  - Is off-line output worth the cost?
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## Nickels and Dimes

A group of New York investors have made a \$90,000 line of credit available to Computer Systems Technology of Jenkintown, Pa. The software house, organized in January 1968, had six-month sales of \$223,000 at the end of October.

\$55

Control Data Corp. must be wishing that it could play follow the leader — IBM — in the profits column, but it's been sidetracked from the game by a bad fourth quarter. The firm said that last year its computer operations had dropped the firm, including the profitable Commercial Credit Corp., into the red in the last quarter. Earnings for 1970 should be well below \$1 per share, and probably as low as 50 cents per share.

SSS

"A title on the door, rates a . . ." Not so at Cipher Data Products, which claims that it has turned the tide from a loss to a profit. It's up 40% and not given newly elected President Bill Otterson a thick carpet. The two-year old tape drive manufacturer claims that sales will hit \$2.5 million in 1971 up from around \$1.5 million in 1970.

SSS

The Viatron debenture exchange offer flopped. While not disclosing any figures, Viatron spokesmen did say that not enough of the debentures were tendered and the exchange offer was withdrawn. (85% acceptance was needed). The next move would seem to be up to the trustee for the debenture issue, the Old Colony Trust Co. of Boston. The terminal market is still in default on the interest payments, and what happens next is a good question.

SSS

Hopping down the money trail, Cogar has found a \$6 million ego in an unnamed institutional investor, for which it swapped 120,000 of its common shares. Cogar said it would use the money for new product development, marketing activities, and — significantly — for lease capital.

SSS

Cincinnati Milacron, the big machine toolmaker and one of the newest manufacturers of minicomputers, has projected writing profits for the fourth quarter. It indicates that first period net will be less than the 33 cents a share of the third period.

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## News Analysis

# 'Subtle' Price Change Thwarts 370 Lessors

By Michael Merritt  
CW Staff Writer

The leasing companies are not buying 370s, that seems clear [CW, Jan. 20]. The subtlety of IBM's pricing change that contributed to the decision takes a little more effort to see.

The straight ratio of purchase price to monthly rental remains in the area of 8%, where it always has been — more or less — for CPUs and memory.

This ratio is important because it determines the period of time a leasing company will be bet on keeping computers in use.

But the straight ratio doesn't tell the whole story. Even though a user owns a computer, he still has to pay IBM to keep

its innards clean, and housekeeping for a 370 costs about six times as much as for a 360.

From the point of view of the leasing companies, it works this way: the purchase price of a 360/50 with 262K is \$63,740, and the monthly rent is \$14,165, and the monthly maintenance on the purchased machine is \$390.

### Discount From Lesors

The third party lessors give a discount of about 18% under IBM prices as a rule. This means that the lessor sees a bill for \$11,615. Out of this the lessor has to pay IBM maintenance, though, so he sees income of \$11,225/mo.

## IBM Earnings Increase 9%, Top \$1 Billion Mark

ARMONK, N.Y. — IBM 1970 earnings topped the billion dollar mark for the first time. It was the 19th straight year of increases for the firm.

The earnings increase was sparked by the best quarter in IBM's history in the three months ended Dec. 31 and by foreign earnings of the IBM World Trade Corp. which topped domestic results for the first time in the history of IBM.

After-tax earnings amounted to \$1,017,521,072 or \$8.92 per share on revenues of \$7.5 billion. In 1969, net income was \$93.9 million or \$8.21 per share on gross income of \$7.2 billion.

"Data processing equipment previously installed with customers on a rental basis was discontinued at a higher rate than in 1969," he said.

### Outright Sales

"But the substantially lower level of outright sales of computer systems, previously reported, was the primary factor which contributed to a decline in domestic operations during 1970."

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At this rate the lessor can pay off the machine in 56.4 months. It is a reasonable gamble that he can keep the machine on lease for more than four years and eight months, thus turning a profit for himself, as well as

computers anyway.

When IBM announced the new machines there was a massive sigh of relief in the leasing industry. By bringing out an interim model, IBM had increased the 360, better than the 360 but not by orders of magnitude. IBM was protecting its own base of 360 equipment.

And incidentally this kept the chestnut of the leasing companies in the air. The sigh of relief is a long way from a whoop of joy, and there haven't been any \$50 million orders from the leasing companies.

Because they can't find the money, really. But also because IBM has its own destiny, and is big enough to prevent anomalies, such as the third party leasing industry, from recurring.

Because there was a bulge of purchases from third-party lessors in 1968 and 1969, IBM's earnings rose faster than corporations overall for 1970.

Then, when the bulge went away, and the rentals weren't coming in from the purchased machines, the temporarily inflated earnings deflated.

IBM — or any other firm for that matter — wouldn't like to have to explain to shareholders a complex reason for sagging profits. But IBM can do something about it.

## Financial

having a nominal residual value of 10% of the purchase price.

To take another popular configuration, a 370/155 with 262K sells for \$1,018,000, rents for \$21,500/mo., and costs \$2,450/mo to maintain.

(Maintenance for this 155 runs 11.4% of the rental, by the way, while it is only 2.8% for the 30.)

### 67 Months

Running the figures out, if the leasing companies are to keep the same 18% discount it takes them 67 months to pay for the machine. Five and a half years. And five and a half years from announcement of 360 to an announcement of 370, and the 370 may well be an interim machine with an even shorter market life expectancy than the 360.

The lessors are thus faced with a much greater risk buying a 370 to lease than they were with the 360.

And most of them would have difficulty finding the capital they would need to buy the new

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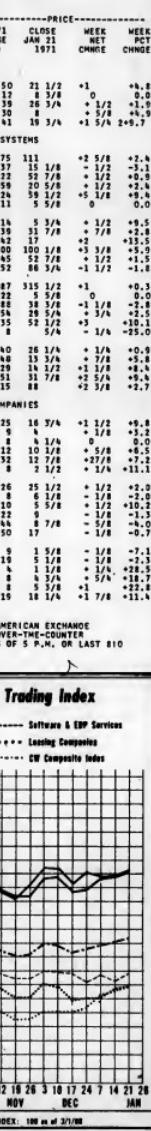


# Computerworld Stock Trading Summary

CLOSING PRICES THURSDAY, JANUARY 21, 1971

All statistics  
compiled, computed  
and formatted by  
**TRADE QUOTES**, INC.  
Cambridge, Mass. 02139

EXCH	PRICE						PRICE					
	1970-71 RANGE		CLOSE JAN 21		WEEK CHNGE		1970-71 RANGE		CLOSE JAN 21		WEEK CHNGE	
	(1)	1970	(1)	1970	(1)	1970	(1)	1970	(1)	1970	(1)	1970
<b>SOFTWARE SERVICES</b>												
O ADVANCED COMP TECH	1	6	2	0	+ 1/8	+ 8.0	O STANDARD REGISTER	17	50	21 1/2	+ 1	+ 8.2
A APPLIED DATA RES.	1	21	5	0	+ 1/8	+ 5.2	O TAB PRODUCTS CO	6	12	8 3/4	0	+ 0.0
O APPLIED LOGIC	1	18	1 1/2	+ 1/8	+ 8.0	+ 0.0	N UARCO	22	39	26 3/4	+ 1/2	+ 1.9
O AUTOMATION	1	18	1 1/2	+ 1/8	+ 8.0	+ 0.0	O URGUCH MAGNETICS	17	39	26 3/4	+ 1/2	+ 1.9
M AUTOMATIC DATA PROG	23	48	67	- 3/2	- 1.0	+ 0.0	O WALLACE BUS FORMS	17	41	19 3/4	+ 1/2	+ 24.7
O AUTO SCIENCES	3	14	6	- 5/8	- 2	- 29.6	<b>COSTUMER SYSTEMS</b>					
O ERANROM APPLIED SYS	1	10	7/8	0	0.0	O ELECTRONIC ASSOC.	3	16	5 3/4	+ 1/2	+ 8.5	
O COMPUTER ANALYSTS	1	18	1 1/2	+ 1/8	+ 11.1	O FORDBORO	18	39	31 7/8	+ 7/8	+ 2.8	
O COMPUTER ENVIRON	1	18	1 1/2	+ 1/8	+ 11.1	O GENERAL AUTOMATION	16	59	52 1/2	+ 1/2	+ 2.4	
O COMPUTER INDUS.	2	24	8 1/2	0	0.0	O GENERAL ELECTRIC	80	100	100 1/8	+ 3/8	+ 13.5	
O COMPUTER INFO. SERV	1	18	1 1/2	+ 1/8	+ 11.1	O HEMELTY-PACKARD CO	19	65	52 7/8	+ 1/2	+ 1.5	
O COMPUTER PROPERTY	7	15	7 5/8	+ 1/8	+ 3.7	O HONEYWELL INC	65	152	88 3/4	+ 1/2	+ 1.2	
H COMPUTER SCIENCES	8	24	11 1/8	+ 1/2	+ 15.1	O IBM	1	8	5 3/4	+ 1/2	+ 8.5	
O COMPUTER TASK GROUP	1	18	1 1/2	0	0.0	O INFRATEL CORP	22	38	31 1/2	+ 1/2	+ 8.5	
O COMPUTER USAGE	2	8	6 1/2	+ 1/8	+ 25.8	O INSTRUMENTATION	30	88	38 3/4	+ 1/2	+ 2.8	
O COMPUTER & SOFTWARE	12	20	26 5/8	+ 1/8	+ 11.1	O NCR	18	56	28 5/8	+ 3/8	+ 2.5	
O COMRESS	1	10	6	+ 1/8	+ 1.1	O PDP EQUIPMENT	15	52	52 1/2	+ 1/2	+ 1.5	
O COMSMAR	7	15	5 1/8	+ 1/8	+ 8.8	O SCIENTIFIC CORP.	1	8	5 3/4	+ 1/2	+ 2.0	
O CONSOL ANAL CENT	1	6	1 5/8	+ 1/8	+ 22.2	<b>LEASING COMPANIES</b>						
O DATA AUTOMATION	1	24	1 1/2	+ 1/8	+ 6.2	O BROTHER COMPUTER	8	25	16 3/4	+ 1/2	+ 0.3	
O DATA PROCESSING	1	18	1 1/2	+ 1/8	+ 11.1	O BRUNSWICK COMP.	2	5	6 1/2	+ 1/2	+ 8.5	
O DATAMATION SERVICE	1	6	2	+ 1/8	+ 1.1	O COMPUTER EXCHANGE	2	8	6 1/2	+ 1/2	+ 0.0	
O DATATAC	1	9	5 5/8	+ 1/8	+ 4.5	O DATA PROC. F & G	8	32	32 7/8	+ 27.8	+ 4.5	
O DIGITAC	1	5	1 5/8	+ 1/8	+ 4.5	O DATRONIC RENTAL	2	8	5 1/2	+ 1/2	+ 11.1	
O ERG RESOURCES	1	13	7	0	0.0	O DEARBORN COMPUTER	10	26	25 1/2	+ 1/2	+ 2.0	
O ELECTRONIC PROG	1	18	7 1/2	+ 1/8	+ 10.8	O DEDISON COMP. LEAS.	2	8	6 1/2	+ 1/2	+ 0.0	
O ELECTRONIC DATA SYS	31	161	76	+ 1/8	+ 16.2	O DISSELSON CAPITAL	9	29	15 1/2	+ 1/2	+ 3.8	
O INFORMATICS	21	27	1 1/2	- 1/8	- 1.7	O DRAMITE MGT	15	22	15 1/2	+ 1/2	+ 1.5	
O INSTRUMENTATION	1	18	1 1/2	+ 1/8	+ 10.8	O EQUITY COMPUTER	5	66	8 7/8	+ 1/2	+ 0.0	
O LEVIN-TOWNSEND SERV	1	13	4 1/2	+ 1/8	+ 2.6	O LEASCO DATA PROC.	7	50	17	+ 1/2	+ 0.7	
A MANAGEMENT DATA	7	23	8 5/8	+ 3/8	+ 47.8	<b>EXCH: N-NY NEW YORK EXCHANGE; A-AMERICAN EXCHANGE</b>						
O NATIONAL CSS INC	1	18	8 3/2	+ 1/8	+ 8.6	O LECTECH INC	3	9	3 1/2	+ 1/2	+ 7.1	
O NAT COMP ANGSTTS	1	18	1 1/2	+ 1/8	+ 11.1	O LIBRARY COMPUTER	1	18	1 1/2	+ 1/2	+ 2.5	
O PLANNING RESEARCH	15	54	18 1/2	+ 1/8	+ 6.2	O LMC DATA INC.	3	6	3 1/2	+ 1/2	+ 18.7	
O PROGRAMMING METHODS	27	18	24 1/2	+ 1/2	+ 21.7	O MCC INDUSTRIES	5	8	5 3/4	+ 1/2	+ 18.7	
O PROGRAMMING-SYS	2	3	2 1/2	0	0.0	O MICRO CAPITAL	1	18	1 1/2	+ 1/2	+ 11.1	
O PROGRAMMING SCIENCES	2	22	3 5/8	+ 1/8	+ 3.3	O N.Y. LEASING	3	19	18 1/2	+ 1/2	+ 11.4	
N SCIENTIFIC RESOURCES	1	22	3 5/8	+ 1/8	+ 3.3	<b>EXCH: O-O COUNTER TO COUNTER</b>						
O SOFTWARE SYSTEMS	1	3	1 1/2	0	0.0	O OCEANIC EXCH	1	9	3 1/2	+ 1/2	+ 2.0	
O SYSTEMS INSTRUMENTS	24	28	20 5/8	+ 1/8	+ 14.4	O PDP EQUIPMENT	15	22	15 1/2	+ 1/2	+ 1.5	
O UNITED DATA CENTER	1	2	1 1/2	0	0.0	O RADIANT	1	18	1 1/2	+ 1/2	+ 0.0	
H UNIVERSITY COMPUTING	18	69	23 1/2	+ 2 1/8	+ 10.8	O REEDCORP	5	66	8 7/8	+ 1/2	+ 4.0	
O URS SYSTEMS	1	21	8	+ 5/8	+ 8.4	O SCIENTIFIC CORP.	7	50	17	+ 1/2	+ 0.7	
O U.S. TIME SHARING	1	14	2	+ 5/8	+ 15.7	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
O PERIPHERALS & SYSTEMS	<b>PERIPHERALS &amp; SYSTEMS</b>											
H ADDRESSOGRAPH-MULTI	20	62	25	+ 5/8	+ 1.5	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
O AUTOPHARMIC	1	18	1 1/2	+ 1/8	+ 1.1	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
N AMPEX CORP	15	48	16 7/8	+ 1/8	+ 3.4	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
O ASTRODATA	1	34	1 1/2	0	0.0	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
O COMPUTER TECHNOLOGY	1	11	8	+ 1/8	+ 2.1	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
A SOLT/BERMAN & NEW	7	11	8	+ 1/8	+ 2.1	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
H BUNKER-RAND	1	18	10 5/8	+ 5/8	+ 10.8	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
A CALCOMP	11	38	25 5/8	+ 1 1/8	+ 4.5	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
O CGNTRONICS	1	18	3 5/8	+ 1/8	+ 8.1	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
O COMPUTER INSTRUMENTS	1	18	3 5/8	+ 1/8	+ 8.1	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
O COMPUTER COMMUN	1	36	5 5/8	+ 5/8	+ 6.2	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
A COMPUTER EQUIPMENT	14	12	7 5/8	+ 1/8	+ 10.8	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
O FARRI-TEC	12	28	14	+ 1/8	+ 0.8	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
O FARRINGTON MFG	1	17	5	+ 1/8	+ 12.2	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
O INFORMATION DISPLAYS	1	20	6 1/8	+ 1/8	+ 2.0	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
O KODAK	1	18	12 1/2	+ 1/8	+ 10.0	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
O MANAGEMENT ASSIST	1	14	12	+ 1/8	+ 10.0	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
A MARSHALL INDUSTRIES	15	67	21 1/2	+ 2 1/2	+ 13.1	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
A MILDO ELECTRONICS	15	92	23 5/8	+ 3/8	+ 1.6	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
N NOMADIC DATA SCI	15	87	25 5/8	+ 1/8	+ 0.8	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
O OPTICAL SCANNING	15	76	18 1/2	+ 1/8	+ 16.1	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
O PHOTOCOPIERS	1	18	12	+ 1/8	+ 3.1	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
O PHOTO-MAGNETIC SYS	1	9	3 7/8	+ 1/8	+ 50.0	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
A POTTER INSTRUMENT	15	42	20 5/8	+ 1 1/8	+ 7.7	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
O PRECISION INST.	15	25	9	+ 1 1/8	+ 20.0	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
O PROGRAMMING EQUIP	15	37	17	+ 1/8	+ 2.0	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
A REEDCORP	1	35	5 5/8	+ 2 1/8	+ 22.5	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
N SANDERS ASSOCIATES	7	29	15 1/8	+ 1 1/8	+ 12.0	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
O SCAI	1	35	12 1/2	+ 1/8	+ 1.8	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
O TALL CORP.	10	25	13 1/8	+ 3/4	+ 4.6	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
H TELEX	10	23	15 5/8	+ 1 1/8	+ 8.5	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
O VIATORW	1	31	1 3/8	0	0.0	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
<b>SUPPLIES &amp; ACCESSORIES</b>												
H AGCO-HILLIGS CORP	5	18	15 5/8	+ 1	+ 6.3	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
O SALT/BERMAN BUS FORMS	6	23	11 1/2	+ 1/8	+ 1.6	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
A SARRY WRIGHT	6	25	8 1/2	+ 1/8	+ 1.6	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
O TECNICAL EXCH	15	30	16 1/2	+ 1 1/8	+ 5.1	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
N ENRIS BUS FORMS	11	39	11 1/2	+ 1/8	+ 5.0	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
G GRAMAN MAGNETICS	1	13	12 1/2	+ 1 1/8	+ 13.3	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
O OPTICAL CONTROLS	5	17	7 1/8	+ 1/8	+ 1.5	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
N MEMORES	66-168	57 3/4	+ 3/8	+ 0.8	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0		
M MOORE BUS FORMS	21	37	37 3/4	+ 5/8	+ 2.7	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
N NASINA CORP	21	43	35 5/8	+ 1/8	+ 0.7	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	
O REYNOLDS & REYNOLD	25	48	40	+ 2 3/4	+ 5.5	O TECNICAL EXCH	1	9	3 1/2	+ 1/2	+ 0.0	



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	



COMPUTERWORLD

## education

### DP Hooks Students, Teachers

BALTIMORE — One-hundred-and-twenty-five Baltimore County high school students have been introduced to a computer and the end result is a lasting and enjoyable friendship.

For the past year, seven senior high schools use the computer facilities at the Baltimore County Board of Education to solve math problems in a myriad of fields. Last summer the county school board provided funds for the construction of a computer laboratory and provided a full-time teacher to assist the students.

"And the program has been successful," observed Vincent Barant, coordinator of

the office of mathematics for the school board.

"They're using the computer not only in the province of mathematics, but in the program for participants students are learning how to increase their motivation."

Mrs. Mary Alice Vollmer, the computer teacher, is enthusiastic about the value of the program for participating students. "The pupils come here and actually work with the computer. It's much less tedious than solving these problems in the classroom," she said.



### LIBERATE 360 MAIN STORAGE

by automatically reducing the size of OS/360 COBOL programs... after compilation

The Capex COBOL OPTIMIZER automatically reduces the size of an IBM 360 COBOL object program by reducing main storage space required for procedural coding by 25% to 35%. Considering the space required for data and other uses, the net space savings generally amount to 20% of the total needed by the program.

**OPTIMIZED programs run faster** — An optimized program uses less CPU time because fewer instructions to execute. In addition, the OPTIMIZER's Dynamic Storage Utilization option will automatically redeploy liberated storage at run time to provide extra I/O buffers, and turn on the OS channel scheduling facility.

**Easy to use, nothing to change** — You run source programs through a compile-and-optimize JCL procedure. That's all. No changes are required in source programs, production JCL operating procedures, the compiler, OS, or debugging procedures.

The OPTIMIZER and the excellent IBM 360 COBOL compiler work together to produce a compact, highly efficient object module. Join the OPTIMIZER evolution.

**Skeptical?** Understandably so...that's why we let you prove it yourself. Write for information.

**OPTIMIZER allows many other throughput enhancements** — For certain programs, you may prefer to use the liberated storage to:

- "sheehorn" programs into standard region or partition
- provide more space for SORT
- reduce overlay
- expand working storage
- reduce region/partition size
- cope with growth of the program

Or the Operating System can utilize the liberated main storage:

- for more multiprogramming
- to reduce scheduling bottlenecks
- to increase the number of core contained system modules
- to cope with increasing growth of the system



2013 North Third Street - Phoenix - Arizona 85004 - Telephone 602/264-7041

### Newark Expects to Show Off Individualized CAI Program

NEWARK, N.J. — A computer-assisted instruction program aimed at developing "Individualization of certain phases of instruction," has been approved by the city Board of Education and will go into operation by March 1.

Serving as a showcase project for the northeastern states, the plan will be conducted by the Educational Science Research Association of Chicago.

The initial phase of the program will be financed, partially by a \$92,500 federal grant under the National Defense Education Act and will be implemented in Clinton High School, Newark.

The program will require the board to obtain an IBM 360/40 on a five-year lease-purchase plan.

The advantages of the system, according to educational authorities, are that it gives the student individual instruction in

subjects in which he is weak and frees the teacher from rote-type instruction, enabling the teacher to diagnose the problems of the other students.

Initially, each student will be tested by the computer to determine specific tutoring needs and then individual programs will be developed for the students.

The computer will also inform the teacher daily of the progress made by the students and the subjects in which help is needed.

### Graphics System Brings Researchers, Computer Together

MADISON, Wis. — The Adage, newest and most revolutionary of the three computing systems at the University of Wisconsin's Computing Center, is making it possible for graduate students and researchers to visually interact with their computers.

The Adage is a computer graphics system developed several years ago to help meet a growing need for visual communication between computer and their users. It has been in operation at the university since July 1969.

By employing one of the most basic forms of communication — pictorial representation — The Adage enables a user to display a graph, chart, drawing, or listing of his data on a CRT. With the assistance of a light pen, the user can move, rotate, and modify his data while viewing it at close range.

The Adage is connected to another computing system, a Univac 1108, which increases the number and size of computing jobs possible through this graphics system.

The Adage is available to university graduate students and to researchers throughout the state.

### Programmer Training Classes Reopened

LOS ANGELES — For those looking for economic indicators signaling an upturn in the economy, a small ray of hope may come from the reopening of programmer training classes at Los Angeles' Urban League Training Center.

The center has been training and placing more than 250 disadvantaged persons in EDP jobs over the past two years, had suspended new programmer classes for six months or so during the recent job crunch.

On Jan. 18, a new class of 20 hopefuls began an intensive three-month Cobol programming course with their IBM instructors.

Reason for resumption of classes is that unplaced backlog of programmer graduates has now dropped to 15, from a high of 20 during the worst of the job downturn in late summer.

### AMA Seminar Canceled

CW Midwest Bureau

CHICAGO — The American Management Association's seminar entitled "What the non-EDP manager needs to know about the computer" has been canceled for its January 18 presentation here.

AMA spokesman attributed the seminar's poor attendance, as shown by reservations, as the reason for the cancellation. They said they felt that "the economy and the month of January, historically bad for seminars, were the reasons for the low attendance reservations."

They said they did not feel that lack of interest in EDP by non-EDP management was the cause.